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APTD-0775

Interim Report

May 12, 1970 through April 14, 1971

FIELD EVALUATION OF NEW AIR POLLUTION MONITORING SYSTEMS:

THE LOS ANGELES STUDY

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National Air Pollution Control Administration
Contract No. CPA 70-101

224

RESEARCH TRIANGLE PARK, NORTH CAROLINA 27709

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BIBLIOGRAPHIC DATA SHEET	1. Report No. APTD-0775	2.	3. Recipient's Accession No.

4. Title and Subtitle
Field Evaluation of New Air Pollution Monitoring Systems: The Los Angeles Study

5. Report Date
April 14, 1971

6.

7. Author(s) L. F. Ballard, J. B. Tommerdahl, C. E. Decker
T. M. Royal and D. R. Nifong

8. Performing Organization Rept. No.

9. Performing Organization Name and Address
Research Triangle Institute
Research Triangle Park, North Carolina 27709

10. Project/Task/Work Unit No.

11. Contract/Grant No.
CPA 70-101

12. Sponsoring Organization Name and Address
National Air Pollution Control Administration
Technical Center
Research Triangle Park, North Carolina 27711

13. Type of Report & Period Covered

14.

15. Supplementary Notes DISCLAIMER - This report was furnished to the Office of Air Programs by Research Triangle Institute, Research Triangle Park, North Carolina 27709 in fulfillment of CPA 70-101

16. Abstracts

The results are reported of a program of which the objectives is to conduct a full scale field evaluation in different geographical areas to determine the effects on the response of ambient air analyzers of typical combinations of pollutants in an urban environment. Instruments for measuring SO_2 and oxidant in the Los Angeles environment are the principle subjects of this interim report. Instruments and methods being evaluated include a Gas Phase Chemiluminescent Ozone Photometer, Solid Phase Chemiluminescent Ozone Photometer, a Coulometric Oxidant Analyzer, a Colorimetric Oxidant Analyzer, a Flame Photometric SO_2 Analyzer, an Automated West-Galke SO_2 Monitor, an Automated GC-FPD SO_2, H_2S Analyzer, a Coulometric SO_2 Analyzer, a Colorimetric NO_2 Analyzer, and a Colorimetric H_2S Analyzer. Supporting meteorological instrumentation includes wind speed and direction, temperature, solar radiation, and humidity sensors.

17. Key Words and Document Analysis. 17a. Descriptors

Air pollution
Monitors
Evaluation
Performance evaluation
Field tests
Sulfur dioxide
Oxidizers
Measuring instruments
Photometers
Gas analyzers
Chemiluminesce
Colorimeters
Coulometers
Flame photometry

17b. Identifiers/Open-Ended Terms
Los Angeles
West-Gake SO_2 Monitor
GC-FPD SO_2 H_2S Analyzer
Air pollution detection

17c. COSATI Field/Group 13B, 7D

18. Availability Statement Unlimited	19. Security Class (This Report) UNCLASSIFIED	21. No. of Pages 223
	20. Security Class (This Page UNCLASSIFIED	22. Price $3.00-0.95

FORM NTIS-35 (10-70) USCOMM-DC 40329-P71 C

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1.0 INTRODUCTION

1.1 Objectives

The purpose of this program is to conduct a full scale field evaluation in different geographical areas to determine the effects on the response of ambient air analyzers of typical combinations of pollutants in an urban environment. The aim is to establish on both an absolute and comparative basis the degree to which the instruments evaluated meet the needs of control agencies for reliable and accurate measurements. It is also desirable to identify certain instruments as prime candidates for adoption as standard instrumental methods that will withstand the scrutiny of scientists interested in the accuracy and validity of measurements.

A large number of ambient air analyzers for ozone and SO_2 have been developed by the Air Pollution Control Office both through inhouse and contract research. Commercial units are also becoming available. Evaluation tests have been conducted on a limited scale up to the present time and significant questions concerning field performance need to be answered [1].

Instruments for measuring SO_2 and oxidant in the Los Angeles environment are the principle subjects of this interim report. Instruments and methods being evaluated include a Gas Phase Chemiluminescent Ozone Photometer, Solid Phase Chemiluminescent Ozone Photometer, a Coulometric Oxidant Analyzer, a Colorimetric Oxidant Analyzer, a Flame Photometric SO_2 Analyzer, an Automated West-Gaeke SO_2 Monitor, an Automated GC-FPD SO_2, H_2S Analyzer, a Coulometric SO_2 Analyzer, a Colorimetric NO_2 Analyzer, and a Colorimetric H_2S Analyzer. Evaluation of a UV Ozone Analyzer and a Colorimetric NO_x Analyzer

was postponed until a later time. Supporting meteorological instrumentation includes wind speed and direction, temperature, solar radiation, and humidity sensors.

1.2 Experimental Approach

A mobile laboratory was considered to be the most realistic method to both transport and house the instruments for the evaluation. Figure 1.1 shows the views of the mobile laboratory before installation of instruments and after location adjacent to the Los Angeles County Air Pollution Control Board's central research facility on the corner of Fifth and San Pedro Streets, in downtown Los Angeles.

Dynamic calibration for the analyzers is provided by an ultra-violet lamp ozone generator and calibrated SO_2 diffusion tubes in a constant temperature water bath. The calibration manifolds extend along the wall behind the instrument cabinets. Positions of the installed analyzers are shown in Figures 1.2 and 1.3. In Figure 1.2a can be seen the Melpar Flame Photometric Analyzer, the Philip SO_2 Analyzer and the GC Flame Photometric SO_2, H_2S Analyzer. Figure 1.2b shows the digital data acquisition system and the signal conditioning unit. Figure 1.2c is the Chemiluminescent Ozone Photometer. Figure 1.3a shows the Technicon CSM-6 Air Monitor which has the capability of simultaneously measuring colorimetrically six air pollutants. Four channels of this instrument were used in place of individual analyzers for the Colorimetric Continuous Oxidant Analyzer, the Automated West-Gaeke SO_2 Monitor, the Colorimetric NO_2 Analyzer, and the Colorimetric H_2S Analyzer. In Figure 1.3b is shown the wind speed and direction, temperature, solar radiation, and humidity sensors. In the close-up of Figure 1.3c may be seen the hooded sample inlet. A more comprehensive description of the analyzers is given in Section 2.0. The calibration system is described in

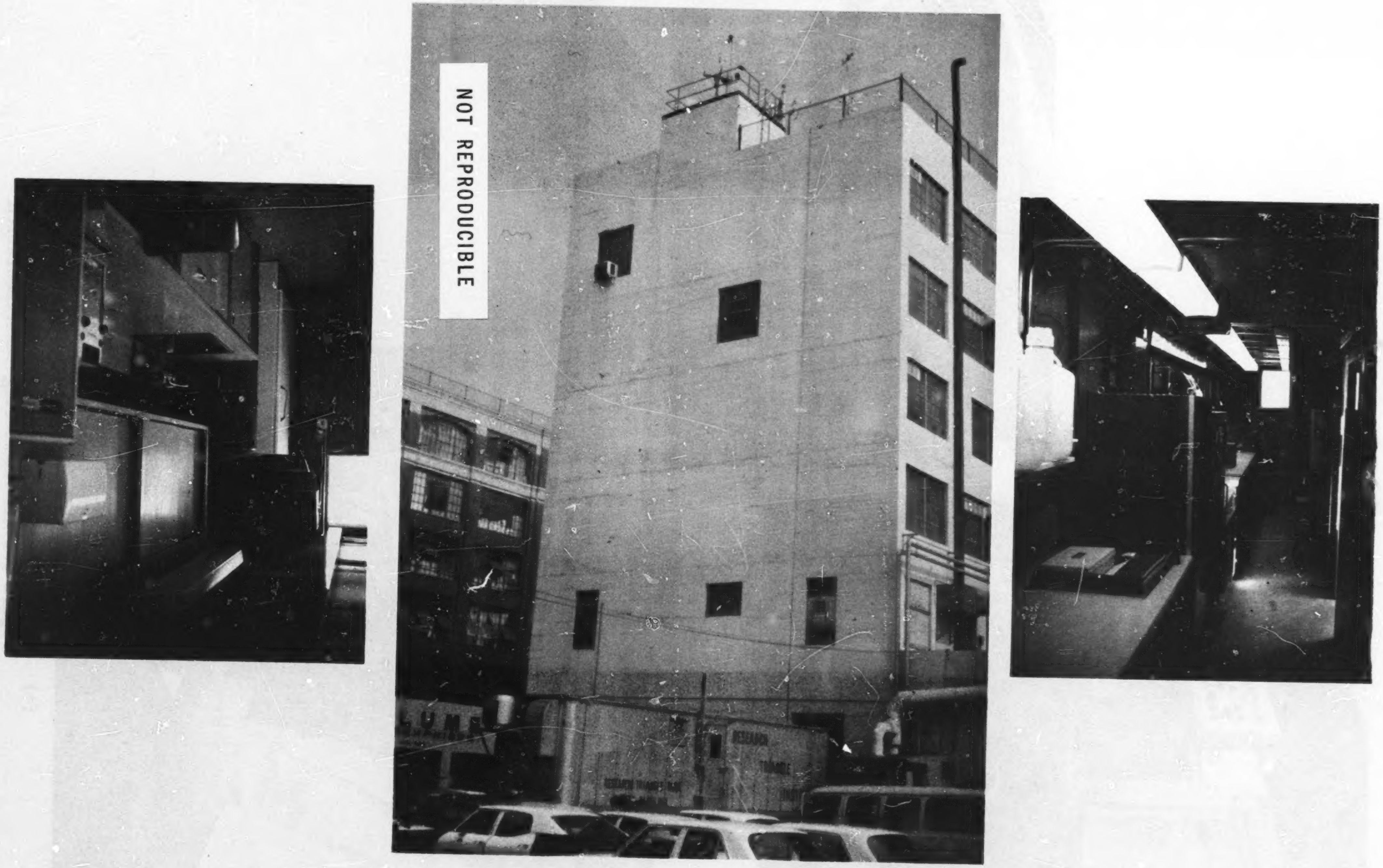

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Figure 1.1 Mobile Field Laboratory

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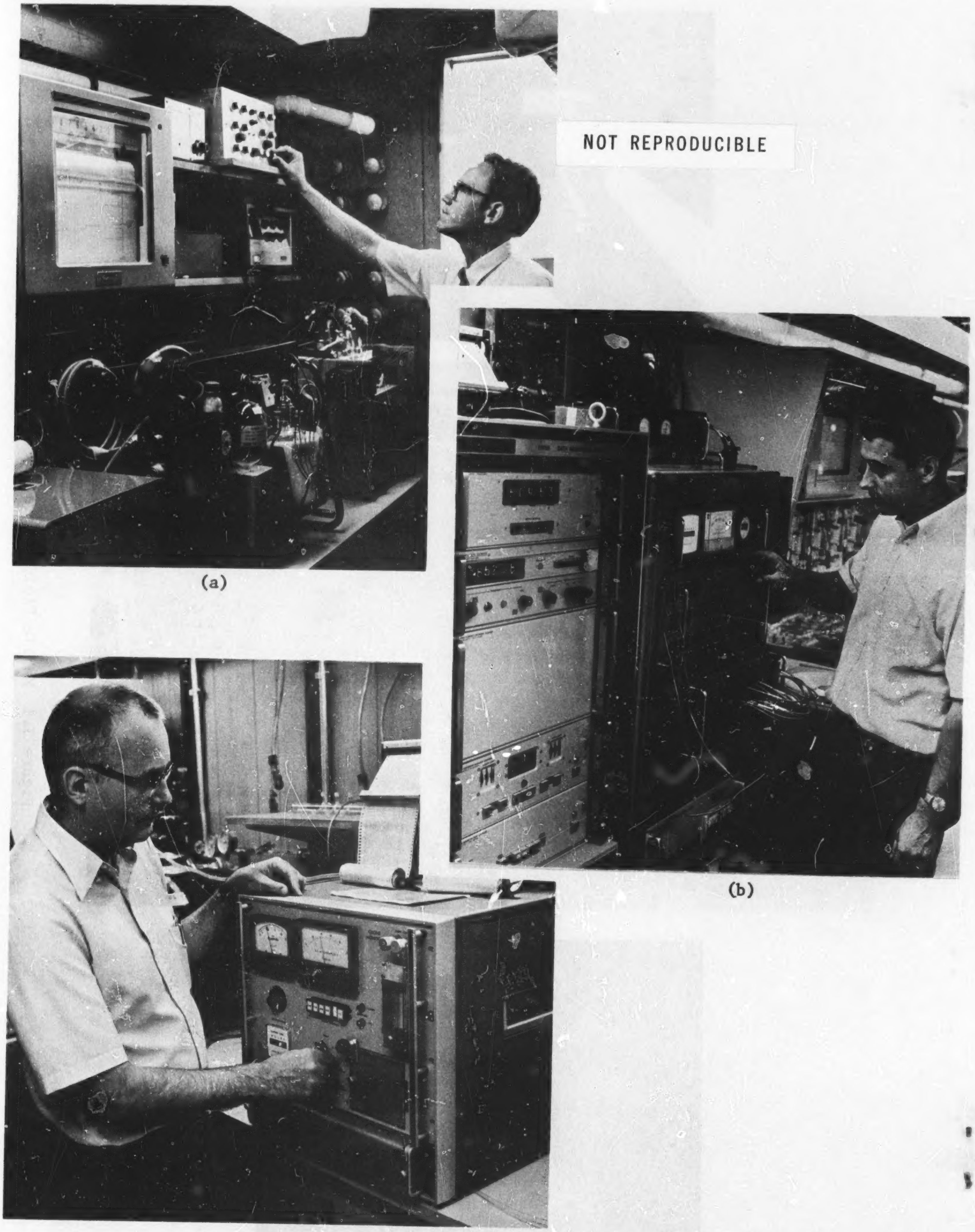

(a)

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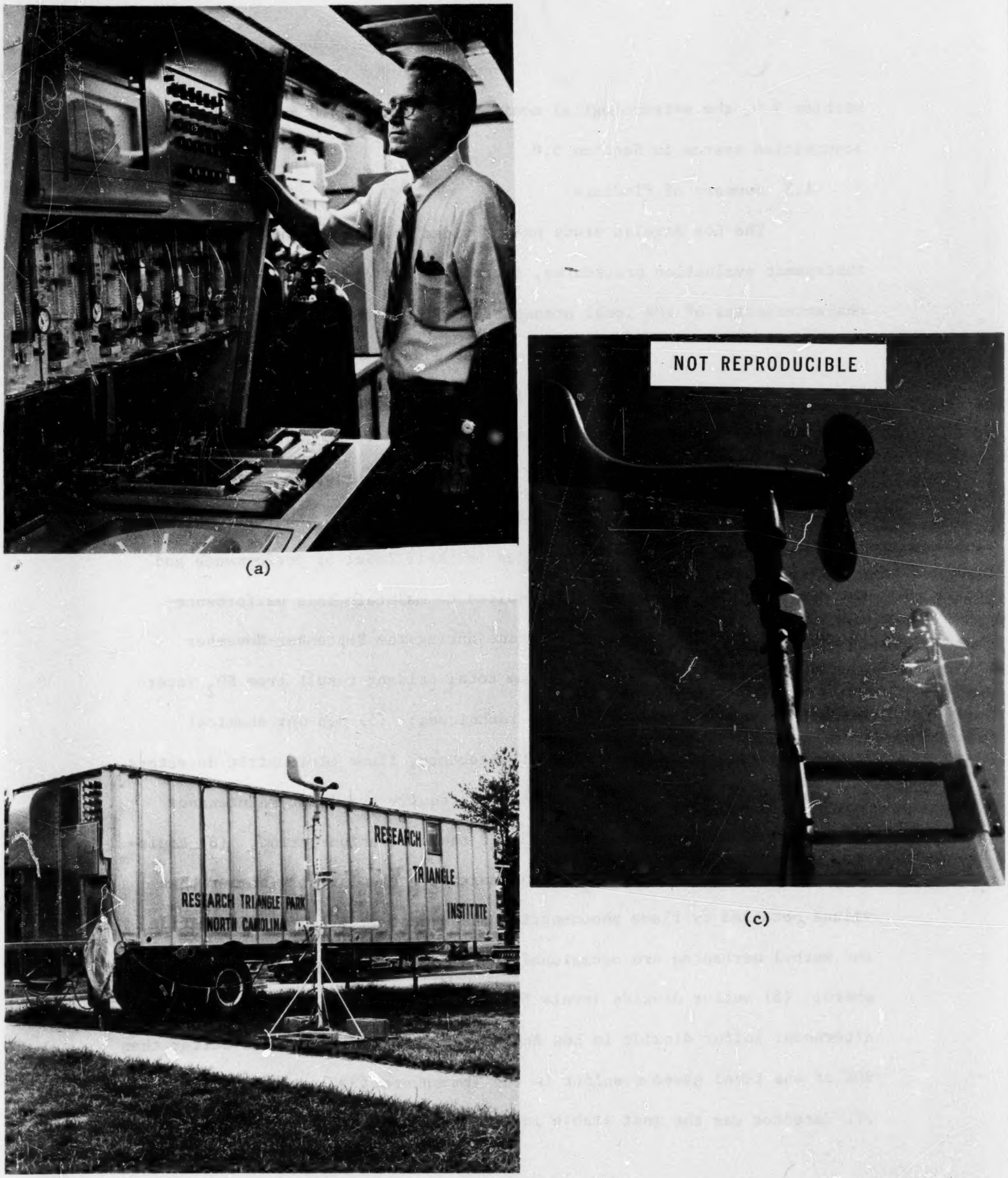
Figure 1.2 Air Monitoring Instrumentation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(a)

(b)

(c)

Figure 1.3 Air Monitoring Instrumentation

Section 3.0, the meteorological monitors in Section 4.0 and the data acquisition system in Section 5.0.

1.3 Summary of Findings

The Los Angeles study has provided valuable information on instrument evaluation procedures, instrument performance, and the characteristics of the local atmosphere. It has shown that: (1) the use of a mobile laboratory and an automated data acquisition system with magnetic tape storage of the data in computer compatible format is a rapid and economical approach to large scale instrument evaluation for atmospheric pollution monitoring; (2) most of the instruments that were studied can accurately measure oxidant, ozone, SO_2, H_2S and NO_2, but there are significant differences in their level of performance and the operator time and materials required to maintain this performance; (3) daytime oxidant is primarily ozone during the September-November period; (4) ozone levels higher than total oxidant result from SO_2 interference to the oxidant measurement techniques; (5) non-wet chemical techniques such as chemiluminescent detectors, flame photometric detectors and gas chromatographic-FPD combinations require the least maintenance and were operational better than 93% of the evaluation period, (6) coulometric and conductimetric SO_2 measurements are consistently higher than values obtained by flame photometric measurements; (7) hydrogen sulfide and methyl mercaptan are occasionally present in the Los Angeles atmosphere; (8) sulfur dioxide levels frequently exceed 0.030 ppm during the afternoon; sulfur dioxide in Los Angeles, California represents better than 90% of the total gaseous sulfur in the atmosphere. (9) In the SO_2 group, the FPD detector was the most stable in terms of calibration reproducibility.

A single average calibration curve for the entire period fits all the calibration data with a standard deviation of about 0.005 ppm over the range zero to 0.080 ppm. (10) In the oxidant-ozone category, the gas phase chemiluminescence (after a two-week break-in period) and coulometric instruments had a standard deviation near zero of about 0.001 ppm. Near 0.1 ppm, the solid phase chemiluminescent instrument was most reproducible with a standard deviation about a single average calibration curve of about 0.002 ppm followed by the gas phase chemiluminescence and coulometric instruments at about 0.003 ppm. (11) The NO_2 colorimetric instrument and NO_2 permeation tube calibration techniques need to be improved.

Additional results and further verification of some of the findings for these and other instruments is anticipated when the mobile laboratory is moved to a St. Louis, Missouri location.

2.0 GAS ANALYZERS

2.1 Chemiluminescent Ozone Analyzer

2.1.1 Instrument Description

The principle of operation of the chemiluminescent ozone analyzer is based on the chemiluminescent reaction between ozone and Rhodamine-B absorbed on a silica-gel disk, causing the emission of a minute amount of light. This emission of light is measured using a photomultiplier tube with the current output from the PM tube being a function of the concentration of ozone passing over and reacting with the Rhodamine-B disk. This technique is based on the work done by Regener [2] and is highly sensitive and specific for ozone. This analyzer operates in a cyclic mode and features a self-contained, ultraviolet ozone generator for dynamic calibration of the system every five minutes. A calibrate and measure signal is alternately displayed every five minutes with a purge cycle of 75 seconds on either side.

2.1.2 Range and Response Characteristics

The linear range of the chemiluminescent ozone meter is 0-0.5 ppm. The minimum detectable concentration for this detector was reported to be 1 ppb [14]. Since a cyclic mode of operation is employed, lag time and total rise time to 95% are equal to the total time for one cycle [i.e. (purge-calibrate-purge-measure) = 5 minutes]. Response time to a given concentration of ozone is approximately 5-10 seconds.

2.1.3 Interferences

No known components of the lower atmosphere other than ozone have been observed to give chemiluminescence with the reactive surface. Regener [2] reported no interference from NO_2, SO_2 or PAN. Recent experiments by Hodgeson et. al [3] have demonstrated that SO_2, H_2S, NO_2, propane, H_2O, NH_3, NO, Cl_2, and H_2O_2 do not interfere.

2.1.4 Operational Summary

The chemiluminescent analyzer was unpacked and put in an operational mode in 20 minutes. One-half hour was required for the system to equilibrate. A multi-point calibration (zero and three points) was run using the calibration system described in Section 3.1. One hour of time was required to complete the initial calibration. A total time of two hours was required to install, equilibrate, calibrate and bring this analyzer on line.

During the three-month evaluation program, the chemiluminescent ozone meter had one failure period, resulting from a mechanical stop in the shutter assembly of the UV ozone generator working loose. This problem was quickly rectified and the instrument performed exceptionally well throughout the duration of the program.

2.1.5 Maintenance

The chemiluminescent ozone meter required no maintenance during the three-month period of time. Maintenance time, repair time, and miscellaneous downtime accounted for 0, 0.004, and 2.9 percent of the total time, respectively.

2.1.6 Cost

Estimated production cost for the chemiluminescent ozone analyzer is approximately $3,900. Cost of operation per week was negligible, since no reagents are required. One reactive surface (i.e. Rhodamine-B on silica gel) will last at least six months under normal operating conditions.

2.2 Gas Phase Chemiluminescent Ozone Analyzer

2.2.1 Instrument Description

A gas phase chemiluminescent ozone analyzer based on the design of Nederbragt [4] and Warren [5] and built at APCO facilities, was installed in the mobile van on September 1, 1970. The theory of operation is based on the gas phase chemiluminescent reaction of ozone with ethylene. The ethylene reaction has been reported to be specific for ozone and has no known interferences. Ozonized air (1 ℓ/min) and ethylene (30 cc/min) are mixed countercurrently in concentric glass tubes closely coupled to the cathode face of the photomultiplier tube. At the present time, no internal calibration source is required.

2.2.2 Range and Response Characteristics

The dynamic range of the gas phase chemiluminescent ozone analyzer was set to 0-0.5 ppm for the Los Angeles phase of the evaluation. The minimum detectable concentration of the system for ozone was reported to be 0.02 ppm [14]. Lag and response time and total rise time to 95% were nominally 0.2, 1.0 and 3.0 minutes, depending upon the RC time constant of the output.

2.2.3 Interferences

No known components of the lower troposphere other than ozone have been observed to give chemiluminescence with the reactive surface.

2.2.4 Operational Summary

The gas phase chemiluminescent ozone analyzer was installed in the mobile laboratory and put in an operational mode in approximately two hours. Initial difficulties were encountered with the dark current of the photomultiplier and the sensitivity of the detector. After these problems had been rectified, 30 minutes were required to equilibrate the system. A multi-point calibration (zero and three points) was run and required one hour for completion. The calibration system described in Section 3.1 was used.

During the three-month evaluation program, the gas phase chemiluminescent ozone meter had one failure, resulting from a constriction in the sample inlet line. This problem has alleviated by moving a teflon value from the inlet to the outlet side of the detector.

2.2.5 Maintenance

The gas phase chemiluminescent ozone analyzer required no maintenance during the three-month period of time. Maintenance time, repair time and miscellaneous downtime accounted for 0.0, 0.3, and 3.4 percent of the total time respectively.

2.2.6 Cost

The estimated cost for a production model of the gas phase chemiluminescent ozone meter is estimated to be $3500. Cost of ethylene per week of operation was approximately two dollars.

2.3 Coulometric Total Oxidant Analyzer

2.3.1 Instrument Description

The principle of operation of the mast coulometric total oxidant analyzer is based on the well-known oxidation-reduction of potassium iodide contained in the sensing solution. Any oxidant (O_3, PAN, NO_2, Cl_2) present in the sample air stream and capable of oxidizing iodide to iodine will produce an instrument response. The oxidation reaction takes place on the cathode portion of the electrode support. A thin layer of hydrogen is also produced on the cathode by a polarization current. When free iodine is liberated by reaction with oxidants (O_3, PAN, NO_2, Cl_2), it immediately reacts with the hydrogen layer. Removal of hydrogen from the cathode causes a repolarization current of two electrons per molecule of ozone entering the sensor and reacting to flow in an external circuit. The rate of electron flow (current) is directly proportional to the mass per unit time of ozone entering the sensor.

2.3.2 Range and Response Characteristics

The range of the coulometric analyzer was adjusted to 0-0.5 ppm full scale via use of a 1250 Ω trimmer-resistor. The minimum detectable concentration for this instrument has been determined to be 0.01 ppm. Lag and response time and total rise time to 95% was determined to be < 1.0, < 1.0, and < 2.0 minutes, respectively.

2.3.3 Interferences

Any oxidant (PAN, NO_2, Cl_2, etc.) capable of oxidizing iodide to iodine can be considered a positive interference in the ozone measurement, while SO_2 and other reducing agents contribute a negative interference. A "CrO_3" scrubber which oxides SO_2 to SO_3, a species that does not interfere, was not used in Los Angeles, since low concentrations below 25 ppb are normally encountered. This omission is consistent and was the Los Angeles APCD policy. Sulfur dioxide was determined to be 1:1 interferent with the ozone measurement, while NO_2 contributed to a 10.3% response. Total oxidants results were corrected for both SO_2 and NO_2 interference and reported as corrected ozone via this method.

2.3.4 Operational Summary

Installation of the coulometric of analyzer in the mobile laboratory required 45 minutes of time. Approximately one hour was required for equilibration of the system. A dynamic multi-point calibration (zero and three points) was run using an ultra-violet ozone generator described in Section 3.1. One hour of time was required to perform this calibration. In all, three hours of time were required to set-up, equilibrate, calibrate, and bring the coulometric analyzer on line.

During the three-month evaluation program, the coulometric analyzer had one failure period, resulting from particulate matter being deposited on the sensing electrode. This instrument was replaced and this analyzer performed well throughout the duration of the measurement program. A bi-weekly multi-point calibration curve was determined to be adequate for this system.

2.3.5 Maintenance

The coulometric analyzer required no maintenance during the evaluation program, other than addition of reagent and emptying waste every three days. Maintenance time, repair time, and miscellaneous downtime accounted for 0, 1.1, and 3.4 percent of the total time, respectively. Reagent preparation required approximately 15 minutes per month.

2.3.6 Cost

The initial cost of the coulometric analyzer excluding a recorder was approximately $950. Cost of reagents per week of operation was estimated to be $0.25.

2.4 Colorimetric Total Oxidant Analyzer

2.4.1 Instrument Description

Channel #5 of the Technicon CSM-6 Air Monitor (equivalent to Technicon Monitor IIA) was set-up to monitor total oxidants using 10% neutral-buffered potassium iodide (KI) reagents. Ten percent KI reagent was substituted for 1% KI to conform to the State of California standard method. The principle of operation is based on the oxidation of iodide to iodine by ozone and other oxidants (i.e. NO_2, PAN, Cl_2). The iodine liberated is a measure of the total oxidant concentration and is analyzed colorimetrically at 352 mμ.

2.4.2 Range and Response Characteristics

The dynamic range of the colorimetric total oxidant analyzer was set to 0-0.5 ppm for the Los Angeles phase of the instrument evaluation program. The minimum detectable concentration has been determined to be 0.01 ppm. Lag time, response time, and total rise time to 95% were 15.0, 9.0 and 24.0 minutes, respectively.

2.4.3 Interferences

Oxidants other than ozone (i.e. PAN, NO_2, Cl_2, etc.) and reducing agents (SO_2, etc.) interfere with the ozone measurement by the colorimetric technique. A "CrO_3" scrubber which oxidizes SO_2 to species that do not interfere (i.e. SO_3), was not used with this analyzer in Los Angeles, since SO_2 concentrations below 0.02 ppm are normally encountered. This omission is consistent with Los Angeles APCD policy. Sulfur dioxide interference with the ozone measurement was determined to be 1:1, while NO_2 contributed a 33% positive interference when 10% KI reagent was used. Total oxidant measurements were corrected for both SO_2 and NO_2 interference and reported a corrected ozone via this method.

2.4.4 Operational Summary

The colorimetric analyzer was set-up and put into an operational mode in one hour. Time required for equilibration (or warm-up) of the system was approximately one hour. A multi-point calibration (zero and three points) was run using the calibration system described in Section 3.1, and required 2.5 hours. Total time required to set-up, equilibrate, calibrate, and bring the colorimetric system on line was 4.5 hours.

During the three-month field evaluation program, the colorimetric analyzer had five failures, resulting from failure of log-amplifier card, crystallization of reagent at air inlet to absorbing column, and pump tube failure. Considerable time was expended when calibrating this instrument due to its long lag and response time. Bi-weekly multi-point calibrations and daily zero adjustments were required for this analyzer.

2.4.5 Maintenance

Considerable time was expended to maintain the colorimetric analyzer. Maintenance, awaiting maintenance, repair, and miscellaneous downtime accounted for 1.0, 3.5, 1.2, and 6.2 percent, respectively, of the total time available for monitoring. Pump tubes were replaced every three weeks and the system flushed with distilled water once a week.

2.4.6 Cost

The initial cost of Channel #5 of the Technicon CSM-6, including the recorder was approximately $4500. Cost of reagents per week of operation amounted to $8.

2.5 Colorimetric SO_2 Analyzer

2.5.1 Instrument Description

Channel #1 of a Technicon CSM-6 Air Monitor was used to measure SO_2 in ambient air during this evaluation. The principle of operation of this continuous wet-chemical monitoring system is based on a modification of the West-Gaeke method. Sulfur dioxide is absorbed in sodium tetrachloro-mercurate forming a nonvolatile dichlorosulfitometcurate complex, which when reaction with formaldehyde and p-rosaniline, forms red-purple p-rosaline methyl-sulfonic acid. The amount of color developed is directly proportional to the concentration of SO_2 in the sample air and is measured automatically in a colorimeter at 560 mμ.

2.5.2 Range and Response Characteristics

A range of 0-0.1 ppm SO_2 was selected for the Los Angeles phase of this evaluation. The minimum detectable concentration was determined to be 0.01 ppm. Lag and response time and total rise time to 95% was determined to be 25.0, 9.0, and 34.0 minutes, respectively.

2.5.3 Interferences

Chlorine, ozone, and nitrogen dioxide can interfere with the colorimetric measurement for SO_2 when concentrations equal to or greater than the SO_2 concentration are encountered. In Los Angeles, the average ozone concentration during daylight hours for the 83-day period was 3 times that of the SO_2 concentration. Sulfamic acid is added to the reagent system to eliminate NO_2 interference [6].

2.5.4 Operational Summary

Installation of the colorimetric analyzer required 60 minutes. Another hour was required for equilibration of the system. A multipoint calibration (zero and three points) was run using zero air and SO_2 air mixtures. Three hours and 45 minutes were required to complete the initial calibration. Approximately six hours of time were required to install, calibrate and bring this instrument on line.

During the three-month field evaluation program, the colorimetric system had two failure periods; one resulting from a log-amplifier failure. The optimum calibration schedule arrived at during this study was a zero point correction daily to correct for and minimize zero drift and a biweekly multi-point calibration. Considerable time was expended performing these calibrations because of the long lag and response time.

2.5.5 Maintenance

The colorimetric analyzer required considerable maintenance and repairs. Maintenance time, awaiting maintenance time, repair time, and miscellaneous downtime accounted for 3.1, 1.9, 4.5, and 12.1 percent, respectively of the total time available for monitoring during the 83 days. Reagent preparation required approximately 30 minutes per week. Pump tubes were replaced every three weeks and required approximately one hour of time. An additional multi-point calibration was then necessary.

2.5.6 Cost

The initial cost of Channel #1 of the CSM-6 Air Monitor was $4,500 including the recorder. Cost of reagents per week of operation was approximately $5.

2.6 Flame Photometric SO_2 Analyzer

2.6.1 Instrument Description

The Melpar SO_2 Analyzer used in this study utilizes the flame photometric detection principle previously described in the literature by Crider [7] and Brody and Chaney [8]. A sample of air is burned in a hydrogen-rich flame converting all volatile sulfur compounds to diatomic sulfur, which is raised to an excited state as it rises in the flame. The resultant release of light energy when the species returns to ground-state sulfur is observed via a photomultiplier tube. A narrow band-pass interference filter and a geometric arrangement that optically shields the photomultiplier tube from the flame is used to selectively look at the luminescent emission of sulfur at 394 mμ. The response of the detector is directly proportional to the concentration of sulfur entering the detector per unit time.

2.6.2 Range and Response Characteristics

Although the response characteristics of the flame photometric analyzer and its application to the continuous measurement of SO_2 in ambient air have been reported by Stevens, et al. [9], the response determined for the analyzer used in this study will be described. The flame photometric SO_2 analyzer has an effective range of from 0.01 ppm to 10 ppm with a minimum detectable concentration of approximately 0.005 ppm. The detector response, however, deviates from a straight line relation (log-log scale) above 1 ppm. The lag and response time, and total time for response to 95 percent were determined to be < 0.5, < 2.5, and < 3.0 minutes, respectively.

2.6.3 Interferences

The flame photometric detector literally responds to all volatile sulfur compounds. Therefore, sulfur containing compounds such as hydrogen sulfide, carbon disulfide, methyl mercaptan and lower members of the mercaptan series of compounds, if present in the air sample would constitute a positive interference to the SO_2 measurement. Response of the flame photometric detector to these interferences is well documented by Stevens, et al. [9].

2.6.4 Operational Summary

Installation of the flame photometric analyzer in the mobile van required approximately 60 minutes of time. Hydrogen gas and a pump were the only accessories required for operation, excluding the recorder. Approximately 60 minutes of time were required for the instrument to stabilize or warm-up. Minor difficulties were encountered with an electrical component which had jarred loose. After appropriate repair had been made and the system allowed to equilibrate, a multi-point calibration curve (zero and three points) was run using the SO_2 calibration system described in Section 3.2. One hour and 10 minutes were required to complete the multi-point calibration. Thus, a minimum of three hours is required to install, equilibrate, and calibrate the flame photometric detector.

During the three-month field evaluation program, the flame photometric analyzer had one failure period caused by a defective pump. Calibration of the flame photometric analyzer was initially run on a weekly basis with daily span checks. This operation procedure with a daily one point calibration, proved to be unreliable and coupled with similar procedures for other instruments added an undue strain on the operator. Biweekly calibrations were then run throughout the duration of the study.

2.6.5 Maintenance

A minimum amount of time was required to maintain the flame photometric analyzer. Twice during the three months period hydrogen cylinders had to be replaced. Maintenance, repairs, and miscellaneous downtime accounted for only 3.12% of the 90-day field measurement program.

2.6.6 Cost

Initial cost of the flame photometric SO_2 analyzer is approximately $3,750, excluding the cost of a recorder. The total cost for operation of this system was $4 per week of operation for the duration of the 90-day program. Maintenance costs were minimal, since no replacement parts were needed and the lone failure was due to a failure in an external vacuum pump.

2.7 Coulometric SO_2 Analyzer

2.7.1 Instrument Description

The principle of operation of the Philips coulometric SO_2 analyzer is based on the stoichiometric reaction of SO_2 with bromine in a titration cell. A redox-potential (originating from Br_2) is established between two electrodes and compared to a reference voltage. Sulfur dioxide scrubbed from the sample air stream reduces the bromine to bromide lowering the Br_2 concentration and the potential of the cell. The current required to re-establish the original redox-potential of the Br_2 cell is then directly proportional to the concentration of SO_2 in the sampled air stream. Provisions are included for instrument zero and a one-point dynamic calibration using a sphere of SO_2 and a permeable orifice.

2.7.2 Range and Response Characteristics

The dynamic full-scale range of this analyzer as supplied by the manufacturer is 0 to 1 ppm. No attempt was made to alter this range for this study. The minimum detectable concentration was determined to be 0.010 ppm. Lag and response time, and total time to 95% response were determined to be < 2.0, < 1.0, and < 3.0 minutes, respectively.

2.7.3 Interferences

Dust, hydrogen sulfide, chlorine, ozone, nitrogen dioxide, and mercaptans have been reported to interfere with the coulometric measurement for SO_2. Provisions are made to remove the above interferences in the Philips system. Dust is removed via a heated filter which also prevents condensation. A second filter containing a heated silver wire is used to convert interfering gas (H_2S, Cl_2, O_3) to species which do not contribute to instrument response. A 1 ppm concentration of hydrogen sulfide produced no instrument response.

2.7.4 Operational Summary

Installation of the coulometric analyzer required approximately 30 minutes of time. The only accessory required by this instrument was a strip-chart recorder. All other components were self-contained. Thirty minutes of time were required for the coulometric instrument to equilibrate. A multi-point calibration (zero and three points) was run using the SO_2 permeation tube system described in Section 3.2. One hour and 10 minutes were required to complete this initial calibration. At least two hours of time are required to install, calibrate and bring this instrument on line.

During the three-month field evaluation program, the coulometric analyzer had one failure period which resulted from a blown fuse. At times undue noise was detected on the recorder output. This was attributed to a faulty electrode which was repaired. Weekly calibrations with daily span checks were initially run; however, these procedures were modified to biweekly multi-point calibrations.

2.7.5 Maintenance

The coulometric analyzer required no maintenance during the 90-day field evaluation program. Repair time and miscellaneous downtime accounted for 0.04 and 7.7 percent, respectively, of the total time available for monitoring.

2.7.6 Cost

The initial cost of the coulometric analyzer, excluding recorder, is $5,250. Cost of operation per week was negligible, since no reagents or external accessories are required.

2.8 Conductimetric SO_2 Analyzer

2.8.1 Instrument Description

The principle of operation of the Leeds & Northrup, Model 7860 aeroscan air quality monitor, is based on the conductivity of the absorbing reagent after air containing SO_2 and/or other soluble electrolyte-forming gases or solids is passed through the contact column. Sulfur dioxide in ambient air reacts with the acidified hydrogen peroxide reagent forming sulfuric acid. Two conductivity cells are employed to measure the electrolytic conductivity of the reagent before and after it absorbs SO_2. The difference in measured conductivity is related to the concentration of SO_2 in the air sample.

2.8.2 Range and Response Characteristics

The range of this conductivity analyzer as supplied by the manufacturer is 0 to 1 ppm full scale. For this study the range was modified so that full scale was 0 to 0.1 ppm, the minimum detectable concentration for this analyzer was determined to be approximately 0.02 ppm. Lag and response time and total time to 95% for this analyzer were determined to be 1.0, 5.0, and 6.0 minutes, respectively.

2.8.3 Interferences

Conductivity analyzers respond to any soluble electrolyte-forming gases or solids. Ammonia, chlorine, nitrogen dioxide, hydrogen chloride, and other gases interfere with conductivity-type measurements for SO_2. The magnitude of these interferences has been reported by Rodes, et al. [1]. Nitrogen dioxide and hydrogen sulfide interference tests were, however, performed on the conductivity analyzer used in this evaluation prior to going to the field. Nitrogen dioxide interference was determined to be 10.6%. Hydrogen sulfide concentrations up to 1 ppm produced no instrumental response.

2.8.4 Operational Summary

Installation of the conductivity analyzer in the mobile van required approximately 90 minutes. Two and one-half hours were required for the instrument to stabilize and level out on zero air. A multi-point calibration (zero and three points) was run using the SO_2 calibration system described in Section 3.2. One hour and 15 minutes were required to complete this calibration. A minimum of 5.5 hours of time were required to set-up, equilibrate, calibrate, and bring this analyzer on-line.

During the three-month field evaluation period, the conductivity analyzer had two failures, both due to the reagent pump losing its prime. During the initial phases of the study, weekly multi-point calibration with daily span checks were run. These procedures were modified to include biweekly multi-point calibrations.

2.8.5 Maintenance

A minimum amount of time was required for maintenance of the conductivity analyzer. Maintenance, repairs and miscellaneous downtime accounted for only 5.2% of the 90-day field measurement program. Reagent preparation time amounted to approximately 15 minutes per week.

2.8.6 Cost

The initial cost of the conductivity analyzer excluding the recorder is $2,670. The total cost for operation of the system and reagent preparation per week was negligible.

2.9 Flame Photometric-Gas Chromatographic H_2S and SO_2 Analyzer

2.9.1 Instrument Description

An automated GC-FPD SO_2 analyzer developed by APCO and described by Stevens, et al. [9], was also used to monitor H_2S and SO_2 during this evaluation. Sulfur containing gases are separated in a 34 ft gas chromatographic column (0.085 in.-id FEP Teflon tubing) packed with 40-60 mesh teflon and coated with polyphenyl ether and quantitatively determined using a flame photometric detector equipped with a 394 nm optical filter. Low ppb levels of H_2S, SO_2, CH_3SH, and C_2H_5SH in ambient air can be quantitatively separated and measured. A typical chromatogram of a mixture of the four previously mentioned sulfur compounds requires about five minutes. The entire procedure is completely automated. During the latter six weeks of the study, a GC-FPD SO_2 analyzer built for APCO by Tracor was substituted for the instrument built by APCO.

2.9.2 Range and Response Characteristics

The range of the GC-FPD analyzer was initially set to 0 to 0.1 ppm full scale. Sensitivities for H_2S and SO_2 of approximately .002 ppm are attainable [10]. Total time required to complete the analysis for H_2S and SO_2 was determined to be 3.0 minutes. Since chromatographic outputs are displayed, response time is not applicable.

2.9.3 Interference

Since a chromatographic column is used to quantitatively separate sulfur-containing compounds (i.e., H_2S, SO_2, and CH_3SH) and of 30,000 to 1 specificity ratio of sulfur to non-sulfur compounds is achieved by the detector, the GC-FPD measurement for H_2S, SO_2, and CH_3SH is specific.

2.9.4 Operational Summary

Installation of the GC-FPD analyzer in the mobile van required two hours of time. Hydrogen, oxygen, nitrogen, and compressed air lines had to be installed. Approximately eight hours were required for equilibration or stabilization of the unit. A multi-point calibration (zero and three points) was run using the H_2S and SO_2 calibration system described in Section 3.2 and 3.4. One hour and 30 minutes were required to complete the calibration. Approximately twelve hours were needed to install, equilibrate, calibration and bring the GC-FPD analyzer on-line.

During the three-month field evaluation program, no instrument failures were noted for the GC-FPD analyzer. Biweekly calibrations were performed for this analyzer during the study.

2.9.5 Maintenance

A minimum amount of maintenance was required to maintain the GC-FPD analyzer. Replacement gas cylinders had to be changed on a monthly basis. Maintenance time amount to 0.09% of the total time. No repairs were required and miscellaneous downtime amounted to 4.1%.

2.9.6 Cost

Initial cost of the GC-FPD analyzer was approximately $12,000, however, three parameters (H_2S, SO_2, CH_3SH) can be monitored. Thus, the cost per parameter was $4,000, excluding the recorder. Cost of gases (H_2, N_2, O_2, air) for operation of the analyzer amounted to $4 per week.

2.10 Colorimetric Hydrogen Sulfide Analyzer

2.10.1 Instrument Description

Channel #6 of the Technicon CSM-6 Air Monitor (equivalent to Technicon IIA Monitor) was used to monitor hydrogen sulfide (H_2S) in ambient air. In this automated continuous monitoring system, H_2S in ambient air is determined as methylene blue [11]. Hydrogen sulfide is absorbed in an alkaline suspension of cadmium hydroxide. An aliquot of the absorbed sulfide sample from the absorption column is fed to the analytical system where it is reacted with para-aminodimethylaniline and ferric chloride to yield methylene blue which is measured colorimetrically at 660 mμ.

2.10.2 Range and Response Characteristics

The dynamic range of this colorimetric analyzer is 0-0.2 ppm and the analytical system has a reported minimum detectable concentration of 0.002 ppb. For this phase of the evaluation, H_2S instrumentation was given third priority behind SO_2 and O_3 instrumentation. Response characteristics were not determined as with other systems due to the limited time available for such tests in the field. The response values reported here are those claimed by the manufacturer. Lag time, response time, and total rise time to 95% are 21.0, 14.0, and 35.0 minutes, respectively.

2.10.3 Interferences

The methylene blue reaction is highly specific for sulfide at the low concentrations usually encountered in ambient air. Strong reducing agents (e.g., SO_2) inhibit color development. No interference is encountered from NO_2 at concentrations less than 0.3 ppm. Ozone at

.057 ppm reduces the recovery of sulfide previously precipitated as CdS by approximately 15%.

2.10.4 Operational Summary

The colorimetric analyzer required one hour for installation in the mobile laboratory. Approximately one hour was required to equilibrate or stabilize the system. A multi-point calibration (zero and three points) was performed using the permeation tube system described in Section 3.4. Three hours of time were required to complete this calibration. Total time required to install, equilibrate, calibrate and bring this analyzer on-line was five hours.

The colorimetric analyzer was brought on-line approximately four weeks after the measurement program had begun. During the remaining two months, the colorimetric analyzer had two failure periods, resulting from bad reagents supplied by Technicon and a logarithmetic amplifier failure. Considerable time was required to calibrate the colorimetric analyzer due to the instrument's long lag and response time. Biweekly calibrations with daily zero adjustments were required to obtain valid data.

2.10.5 Maintenance

Maintenance, awaiting maintenance, repair, and miscellaneous downtime accounted for 9.4, 0.4, 1.3, and 39.7 percent, respectively, of the total time available for monitoring. Less than 50% valid data were obtained during this field program with the colorimetric analyzer.

2.10.6 Cost

The initial cost of Channel #6 of the Technicon CSM-6 Air Monitor including the recorder was approximately $4,500. Cost of reagents per week of operation was $8.05.

2.11 Colorimetric Nitrogen Dioxide Analyzer

2.11.1 Instrument Description

Channel #2 of the Technicon CSM-6 Air Monitor (equivalent to Technicon Monitor IIA) was set-up to monitor NO_2 in ambient air. The principle of operation of the colorimetric analyzer is based on the Lyschkow modification [12], of the Saltzman method [13]. Nitrogen dioxide in the sample air stream diazotizes sulfanilamide in an acid medium and is reacted with N-1(Naphthyl)-ethylene-diamine-dihydrochloride, a coupling agent, to produce a pink-colored azo-dye which is measured colorimetrically at 560 mμ. The absorbance of the azo-dye in the absorbing reagent is directly proportional to the concentration of NO_2 in the air sample.

2.11.2 Range and Response Characteristics

The dynamic range of this colorimetric NO_2 analyzer was set to 0-0.5 ppm for this phase of the evaluation program. The minimum detectable concentration for the analyzer was determined to be 0.013 ppm. Lag time, response time, and total rise time to 95% were 20.0, 18.0 and 38.0 minutes, respectively.

2.11.3 Interferences

Interferences from nitrogen oxides and other gases that might be found in polluted air with the exception of high concentrations of O_3 and SO_2 have been reported to be negligible.

2.11.4 Operational Summary

The colorimetric analyzer was set-up and put into an operational mode in 1.5 hours. Equilibration or warm-up time for the analyzer was approximately 1.0 hours. A multi-point calibration (zero and three points) was performed and required 3.0 hours to complete. Total time required to set-up, equilibrate, calibrate, and bring this instrument on line was 5.5 hours.

During the three-month field evaluation program, the colorimetric analyzer had two failure periods, resulting from collection of precipitate (azo dye) on the glass beads and subsequent entrainment of solid particles throughout the sample transmission tubing. Considerable time was required when calibrating due to the instruments' long lag and response time. Biweekly calibrations with daily zero adjustments were required to obtain valid data.

2.11.5 Maintenance

Considerable time was required to maintain the colorimetric NO_2 analyzer. Maintenance, awaiting maintenance, repair, and miscellaneous downtime accounted for 2.8, 2.1, 5.5, and 7.6 percent, respectively, of the total time available for monitoring. Pump tubes were replaced every three weeks. The entire plumbing system had to be flushed with 2N HCl followed by distilled water on a weekly basis to remove particulates and prevent film buildup on the flow cell.

2.11.6 Cost

The initial cost of Channel #2 of the Technicon CSM-6, Air Monitor including the recorder was approximately $4,500. Cost of reagents per week of operation was $8.

3.0 CALIBRATION AND AMBIENT AIR SAMPLING SYSTEMS

3.1 Ozone Calibration

A dynamic calibration system using an ultraviolet ozone generator described by Hodgeson et al. [14] was used to calibrate the total oxidant (O_x) and ozone (O_3) monitors. Briefly, the ozone source consists of an 8-inch ultra-violet mercury lamp which irradiates a 5/8" quartz tube through which clean (compressed) air flows at 5 liters/minute. Ozone concentrations from 0 to approximately 1 ppm were generated by removing the shield thus exposing the lamp. Although the UV O_3 generator has been shown to be quite stable and reproducible, the neutral-buffered KI technique was used as a reference method [13]. A permanent calibration set-up consisting of a zero air source, calibrated rotameter, UV generator and a glass manifold of sufficient length to provide calibration mixtures of ozone to each instrument was installed behind the ozone monitors (Figure 3.1). Six ball and socket sampling ports were located along the manifold allow easy hook-up of the instrument sample inlet lines during calibration. All O_x and O_3 monitors were calibrated simultaneously and referenced back to the manual KI method.

3.2 Sulfur Dioxide Calibration

A dynamic calibration system using a gravimetrically calibrated SO_2 permeation tube [15,16] as a primary standard and zero air as diluent was used to provide known concentrations of SO_2 to the respective analyzers. Figure 3.2 shows the permeation tube calibration system used for this investigation. The permeation tube was housed in a pyrex glass holder and immersed in a constant temperature bath which maintained the tube at a temperature of 20.3°C ± 0.1°C.

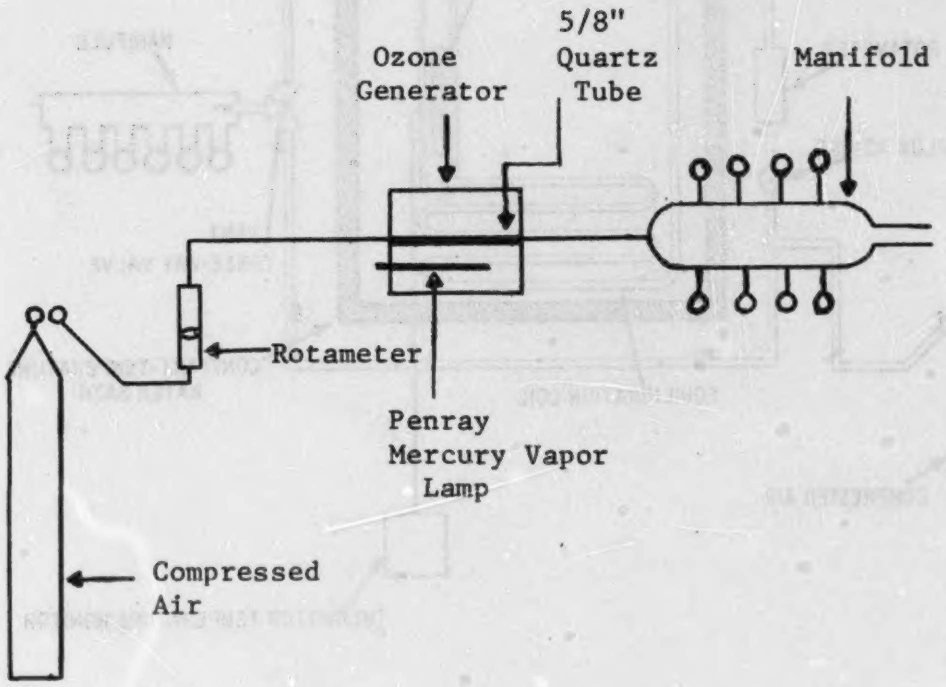

5/8"
Quartz
Tube
Ozone
Generator
Manifold
Rotameter
Penray
Mercury Vapor
Lamp
Compressed
Air

Figure 3.1 Ozone Calibration System

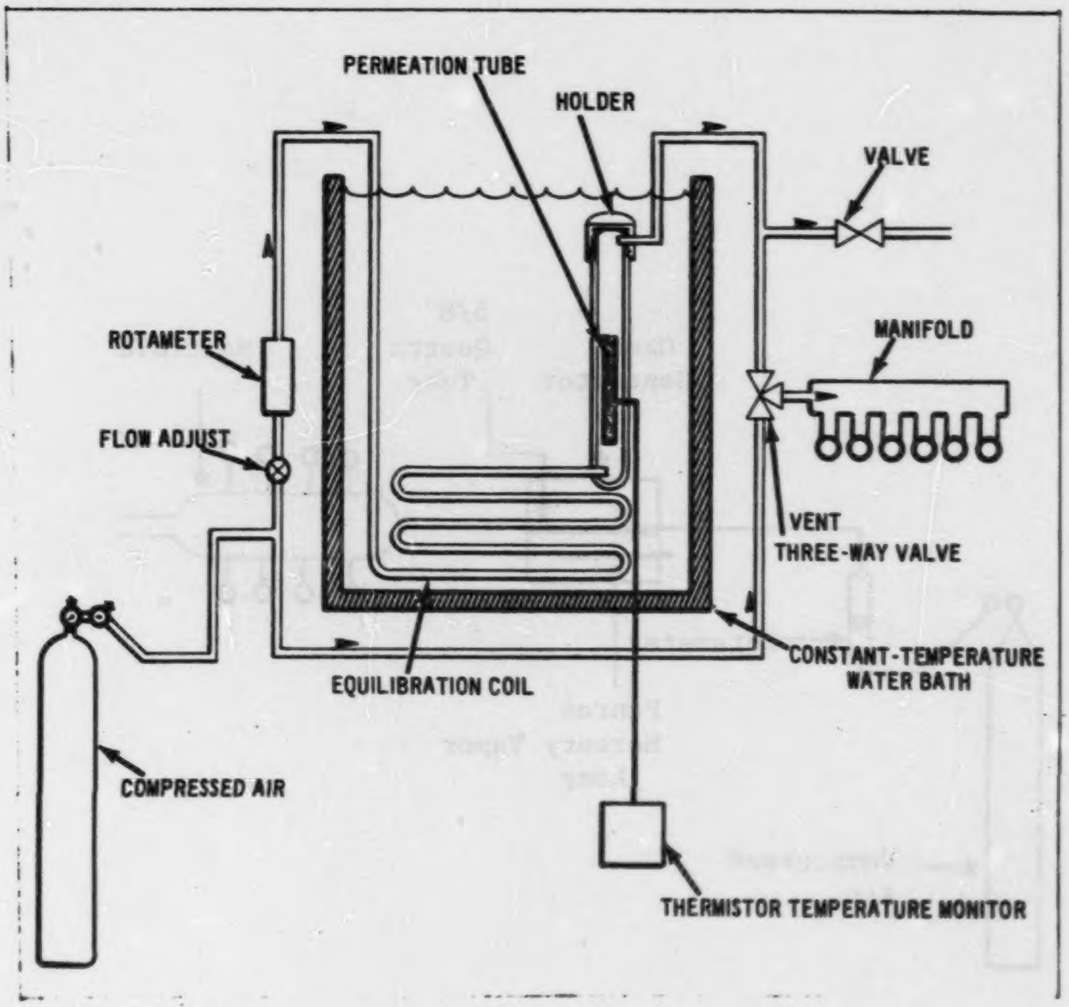

PERMEATION TUBE
HOLDER
VALVE
MANIFOLD
ROTAMETER
FLOW ADJUST
VENT
THREE-WAY VALVE
CONSTANT-TEMPERATURE WATER BATH
EQUILIBRATION COIL
COMPRESSED AIR
THERMISTOR TEMPERATURE MONITOR

Figure 3.2. Permeation Tube Calibration System

Dry, compressed air, conditioned to the temperature of the bath and metered through a rotameter was passed over the permeation tube and into a 1" O.D. glass manifold which was installed behind the SO_2 analyzers. Ball and socket connections were used to allow easy hook-up of the instrument sample inlet lines to the manifold during calibration. By varying the diluent air flow rate, SO_2 concentrations of 0 to 0.2 ppm were generated and simultaneously supplied to all the SO_2 monitors during calibration. An excess of calibration air over and above the instrument's requirements was maintained at all times. The permeation tube used during this field evaluation program was calibrated by the National Bureau of Standards.

3.3 Nitrogen Dioxide Calibration

A dynamic calibration system identical to the one described in 3.2 (Figure 3.1) was used with a NO_2 permeation tube to provide known concentrations of NO_2 to the colorimetric analyzer. The permeation tube was prepared as described by O'Keeffe and Ortman and calibrated gravimetrically at 20.3°C [15]. Concentrations from 0 to 0.5 ppm NO_2 were generated and supplied to the NO_2 analyzer via a short manifold. The output of the NO_2 permeation tube was determined by weight loss and verified once by the manual Saltzman method [13]. A decrease in permeation rate occurred with time.

3.4 Hydrogen Sulfide Calibration

A dynamic calibration system identical to the one described in 3.2 (Figure 3.1), was used with a gravimetrically calibrated H_2S permeation tube to provide simultaneous concentrations of H_2S to the GC-FPD and colorimetric analyzers. Concentrations from 0 to 0.2 ppm H_2S were generated and supplied to the analyzers via a short manifold.

3.5 Ambient Air Sampling System

The mobile van was parked adjacent to the Los Angeles County Air Pollution Control District Headquarters Building at 434 S. San Pedro Street, Los Angeles, California. In order to avoid influence of eddy currents and street pollution, the sample inlet was located on top of the APCD Building. A 1" I.D. TFE Teflon tube 80 feet in length extended from the sample holder located on the meteorological tower to the trailer where it connected to a 1" O.D. pyrex glass manifold which extended behind the air monitoring systems. This arrangement is shown in Figure 3.3. A glass flower pot protected the sample inlet and prevented moisture and settleable particulates from entering the sample line. Sample air was aspirated via a blower through the teflon inlet line and glass manifold at a rate of 3 CFM. Sampling ports made of 12/5 ball and socket joints were used for easy hook-up of instrument sample inlet lines.

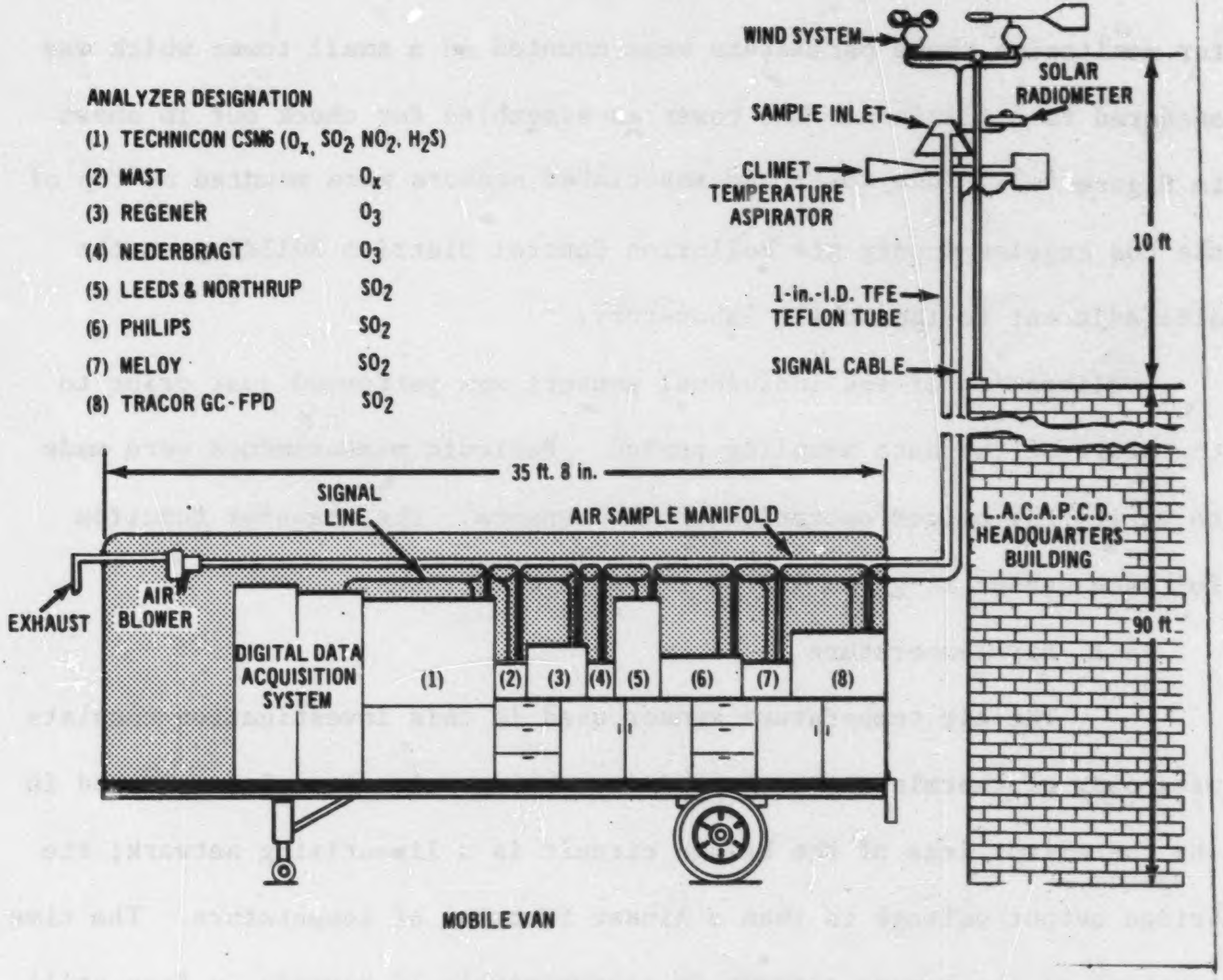

ANALYZER DESIGNATION
(1) TECHNICON CSM6 (O_x, SO_2, NO_2, H_2S)
(2) MAST O_x
(3) REGENER O_3
(4) NEDERBRAGT O_3
(5) LEEDS & NORTHRUP SO_2
(6) PHILIPS SO_2
(7) MELOY SO_2
(8) TRACOR GC-FPD SO_2
WIND SYSTEM
SOLAR RADIOMETER
SAMPLE INLET
CLIMET TEMPERATURE ASPIRATOR
10 ft
1-in.-I.D. TFE TEFLON TUBE
SIGNAL CABLE
35 ft. 8 in.
SIGNAL LINE
AIR SAMPLE MANIFOLD
L.A.C.A.P.C.D. HEADQUARTERS BUILDING
EXHAUST
AIR BLOWER
DIGITAL DATA ACQUISITION SYSTEM
(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)
90 ft
MOBILE VAN

Figure 3.3 Diagram of Air Sampling System and Sulfur Dioxide and Ozone Monitors in Mobile Laboratory

4.0 METEOROLOGICAL SENSORS

The following meteorological parameters were monitored throughout the duration of the field evaluation program: wind speed and direction, ambient air temperature, relative humidity and solar radiation. Sensors for monitoring these parameters were mounted on a small tower which was anchored to a platform. The tower as assembled for check out is shown in Figure 4.1. This tower and associated sensors were mounted on top of the Los Angeles County Air Pollution Control District Building on the side adjacent to the mobile laboratory.

Calibration of the individual sensors was performed just prior to the start of the data sampling period. Periodic measurements were made to verify the proper operation of the sensors. The transfer function for each sensor is given in the respective sections.

4.1 Air Temperature

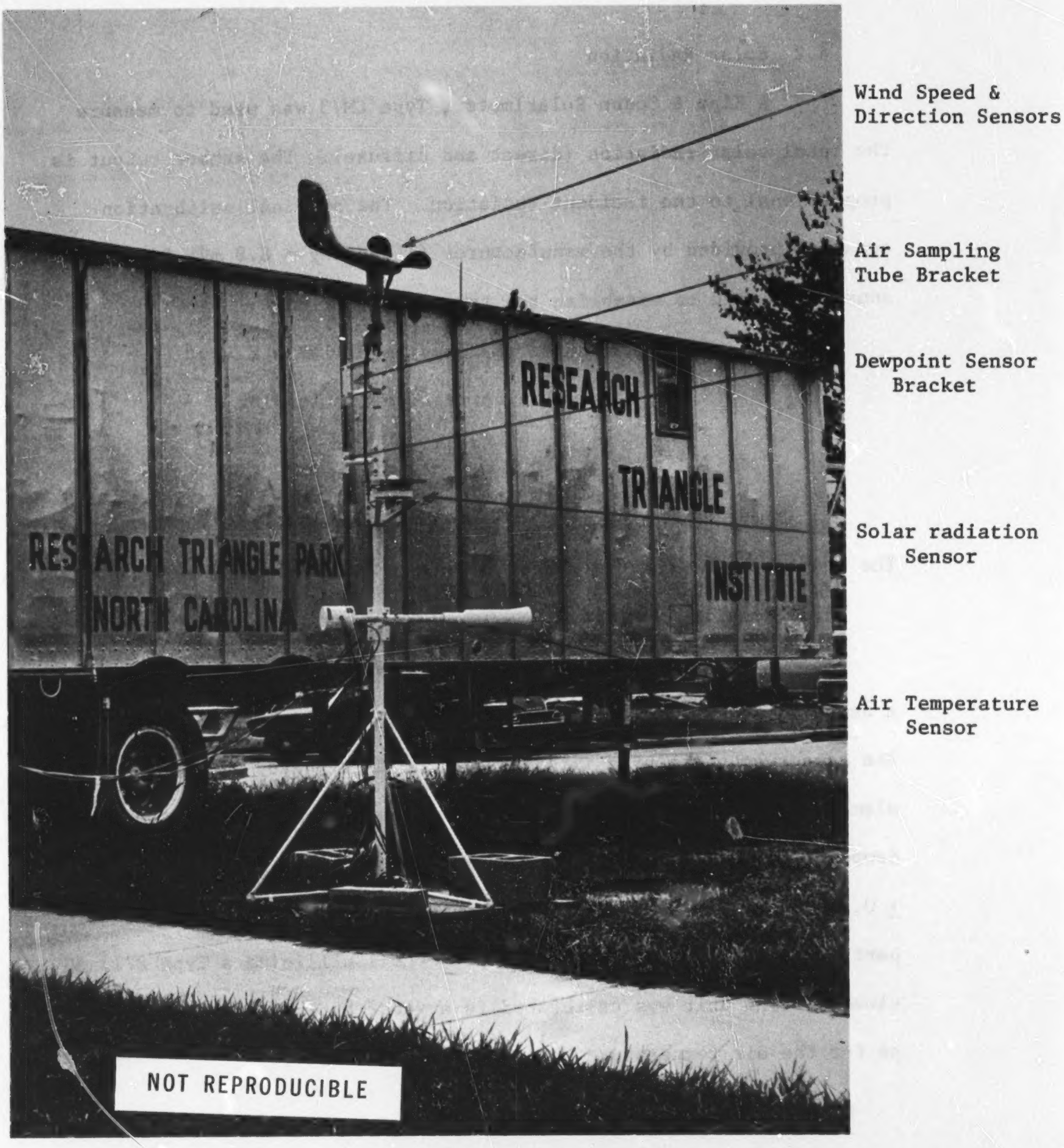
The air temperature sensor used in this investigation consists of a pair of thermistors connected in a bridge circuit. Incorporated in the thermistor legs of the bridge circuit is a linearizing network; the bridge output voltage is then a linear function of temperature. The time constant of the sensor element is approximately 10 seconds in free still air. The sensor was mounted in a Climet Aspirated Shield which has an aspiration rate of 16 ft^3/minute. The sensor was calibrated in a water bath against a quartz temperature sensor accurate to ± 0.02°C. The transfer function for ambient temperature is:

$$\text{Ambient Temperature } (\overset{\circ}{C}) = 0.4\, e_0'$$

where e_0' is the bridge voltage correction given by

$$e_0' = \frac{0.445}{E_{bb}}\, e_0$$

and e_0, e_{bb} are the measured output voltage and bridge voltage, respectively; e_0 is in mV, and E_{bb} is in volts.


Wind Speed &
Direction Sensors
Air Sampling
Tube Bracket
Dewpoint Sensor
Bracket
Solar radiation
Sensor
Air Temperature
Sensor
RESEARCH
TRIANGLE
INSTITUTE
RESEARCH TRIANGLE PARK
NORTH CAROLINA

NOT REPRODUCIBLE

Figure 4.1 Meteorological Sensor Tower

4.2 Solar Radiation

A Kipp & Zonen Solarimeter, Type CM/3 was used to measure the total solar radiation (direct and diffuse). The sensor output is proportional to the incident radiation. The original calibration equation provided by the manufacturer (1 Langley = 8.8 mV) for the sensor was used to establish the transfer function:

$$\text{Solar Radiation (Langley)} = 0.1147\, e_0 k$$

where k is the correction for loading

$$k \approx \frac{1515}{1500}, \text{ and}$$

e_0 is the measured output signal in mV.

The response time for the sensor is on the order of 3 seconds.

4.3 Relative Humidity

Relative humidity measurements were made continuously with a dewpoint sensor and checked periodically with a sling psychrometer. The sensor consists of a lithium chloride impregnated wick and a heater element which keeps the unit at an equilibrium which is related to the dewpoint temperature. The accuracy of the element is on the order of ± 0.5°C and it has a response time on the order of 1°C/minute. The particular sensor used was a Foxboro Dewcell utilizing a Type 2711 AG element. The unit was calibrated in a water bath using the same system as for the air temperature calibration. The transfer function is:

$$\text{Dewpoint Temperature (C°)} = 2.27\, e_0' - 10,$$

$$e_0' = \frac{0.6437}{E_{bb}} \quad e_0, \text{ and}$$

e_0 and E_{bb}, are the measured output voltage and bridge voltage, respectively; e_0 is in mV, and E_{bb} is in volts.

4.4 Wind Speed and Direction

Wind speed and direction were measured continuously with a modified Bendix Aerovane. The synchro receiver for the wind direction sensor mechanically drives a linear potentiometer which is adjusted for the output voltage and direction to have the following relationship:

$$\text{Wind direction (deg)} = 393\, e_0 + 6,$$

where e_0 is the measured output voltage in volts.

The wind speed sensor drives the recommended load resistance and the output voltage is related to wind speed as follows:

$$\text{Wind Speed (knots)} = 100\, e_0,$$

where e_0 is the measured output voltage in volts.

The wind direction and wind speed sensors have accuracies on the order of ± 0.1° mph and ± 3°, respectively, with a starting threshold of approximately 0.75 mph. Since wind speed and direction are subject to relatively rapid variations, it was necessary to average or smooth the respective output signals with simple RC filters. The resulting response times were on the order of $\tau = 3$ minutes where τ represents one time constant.

5.0 DATA ACQUISITION SYSTEM

5.1 General System Description

The basic purpose of the data acquisition system is to automatically acquire and record in digital form the output signals derived from the air monitoring instruments, etc. The data acquisition system consists basically of the signal conditioning circuitry, on-line digital and analog recording systems and power supply units. The off-line data processing is an important consideration in nearly all aspects of the design of the data acquisition system.

A block diagram illustrating the functional relationships between the various sub-systems which comprise the data acquisition system is shown in Figure 5.1; a photograph of the data acquisition system is given in Figure 5.2. The output signal from each of the gas and meteorological sensors is fed into the sensor coupler. All signal cables are connected to this unit by means of standard cable connectors which are mounted on a junction box, which allows for ease in installation and checkout, and versatility in modification of the system. The data is sampled in sequence once every 5 minutes and requires approximately 12 seconds for a complete scan. This includes all of the chemical, meteorological and manual data entries as shown in Table 5.1. All of the signals are accessible at the patch panel for test and monitoring purposes, except for the manual data entries and the test voltages in channels 16 thru 20.

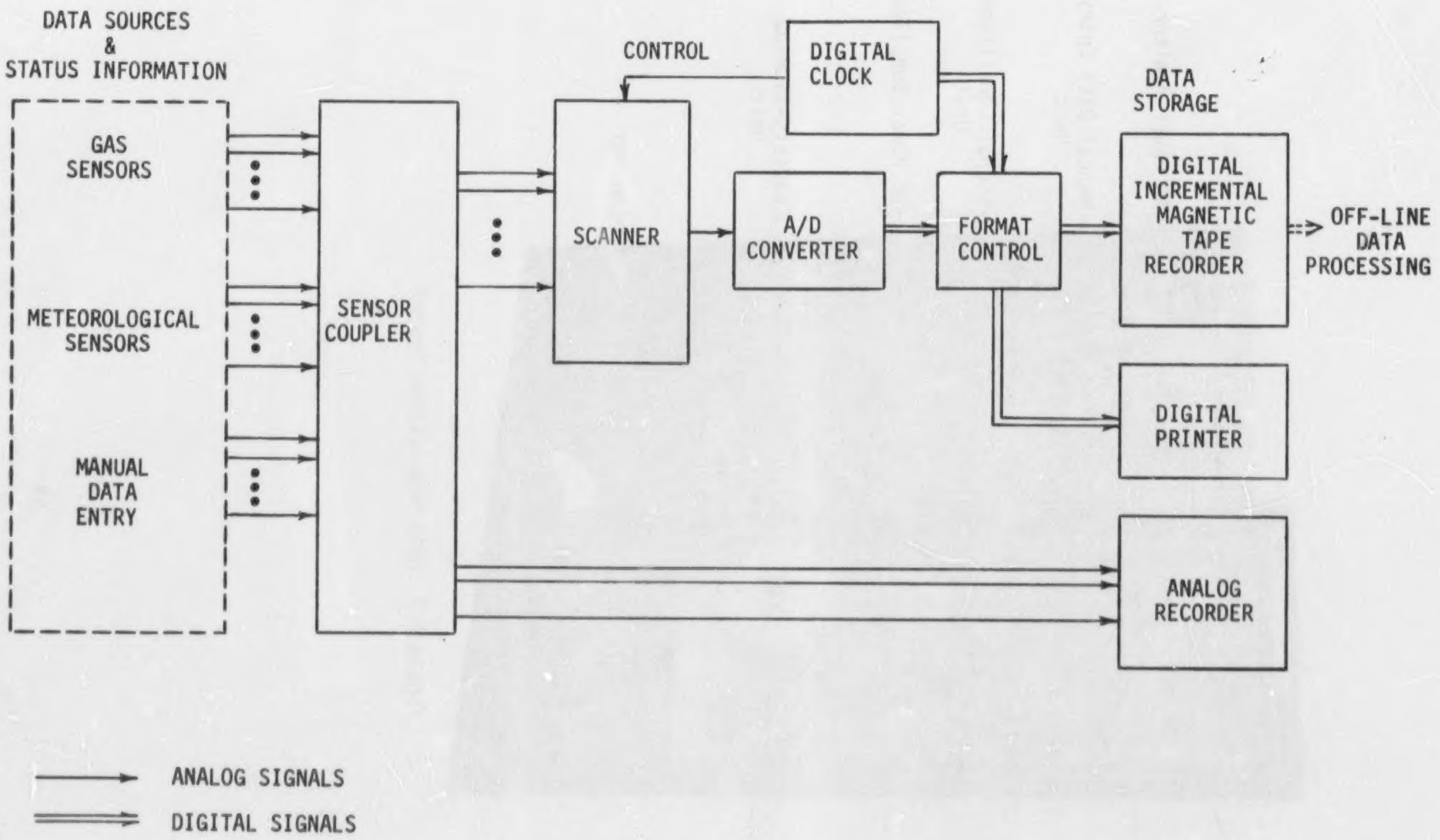

DATA SOURCES
&
STATUS INFORMATION
GAS SENSORS
METEOROLOGICAL SENSORS
MANUAL DATA ENTRY
SENSOR COUPLER
CONTROL
SCANNER
DIGITAL CLOCK
A/D CONVERTER
FORMAT CONTROL
DATA STORAGE
DIGITAL INCREMENTAL MAGNETIC TAPE RECORDER
OFF-LINE DATA PROCESSING
DIGITAL PRINTER
ANALOG RECORDER
ANALOG SIGNALS
DIGITAL SIGNALS

FIGURE 5.1 FUNCTIONAL DIAGRAM OF DATA ACQUISITION SYSTEM

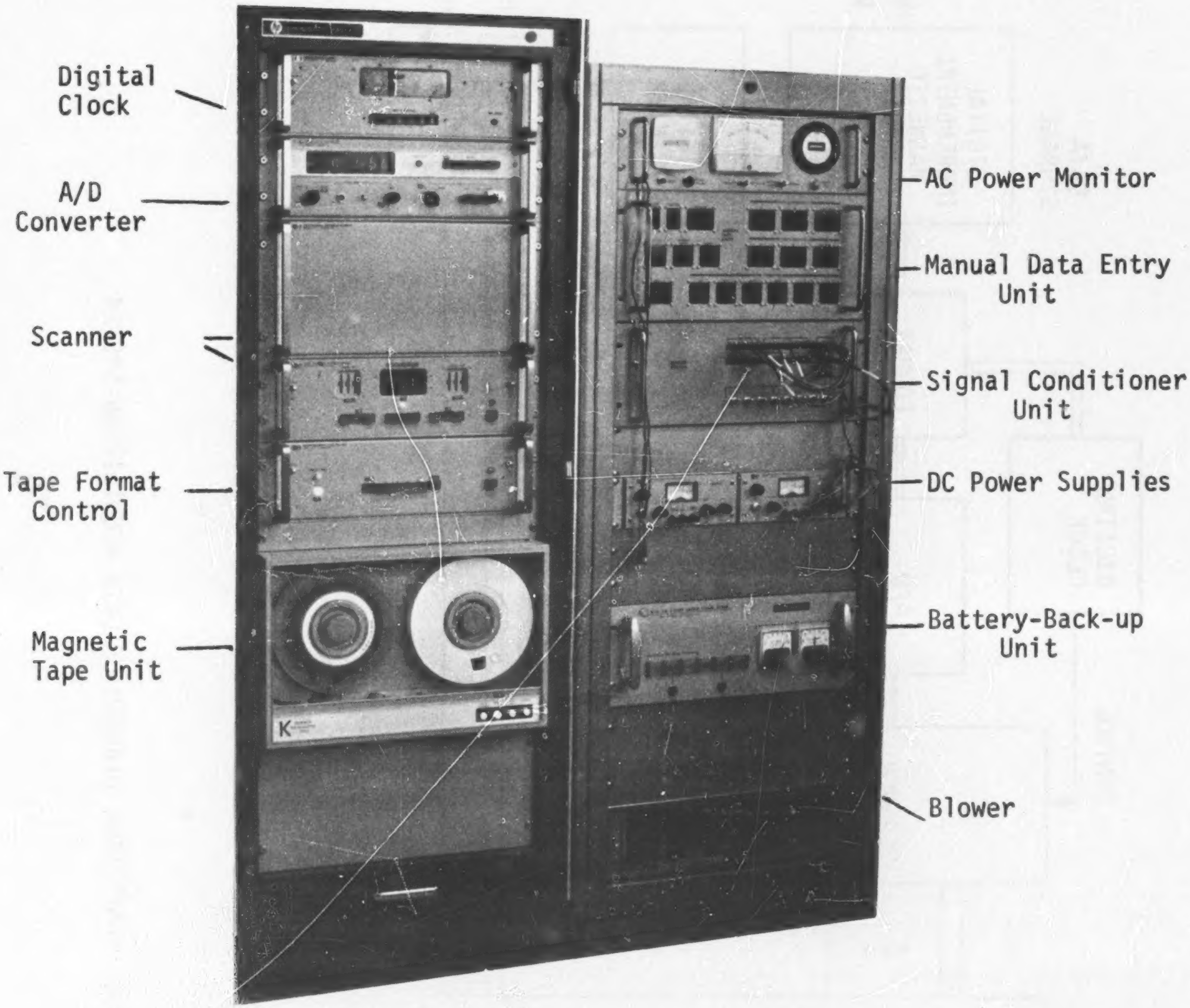

Digital Clock
A/D Converter
Scanner
Tape Format Control
Magnetic Tape Unit
AC Power Monitor
Manual Data Entry Unit
Signal Conditioner Unit
DC Power Supplies
Battery-Back-up Unit
Blower

Figure 5.2 Data Acquisition System

NOT REPRODUCIBLE

TABLE 5.1

SAMPLING SEQUENCE

1. Sensor State
2. Spare
3. Spare
4. Spare

5. Measure-Chem. O_3
6. Calibrate-Chem. O_3 |9|
7. Purge-Chem. O_3

8. Ambient Temp. —— |4|
9. (Temp. Spare)
10. Amb. Temp. Bridge Volt
11. Wind Speed —— |1|
12. Wind Direction —— |2|
13. Solar-radiation —— |3|
14. Dew Point —— |5|
15. Dew Point Bridge Volt

16. * + 15 V
17. * - 15 V
18. * - 0.25 V (+ 5 mV)
19. * + 0.75 V (+ 10 mV)
20. * Short - 0 Volt

21. Technicon SO_2
22. Technicon NO_2
23. Technicon Total O_x
24. Technicon H_2S

---

* - Digital Only

( ) - Analog Only

_ - Manual Data Entry

25. Melpar SO_2 —— |11|
26. GC-H_2S
27. GC-SO_2
28. Spare #3

29. L & N-SO_2 —— |10|
30. Spare (L & N)

31. Philips-SO_2 —— |12|

32. Mast-O_3 —— |6|

33. Kruger-O_3
34. Kruger-Measurement Mode

35. Gas Phase O_3 —— |7|

36. Technicon Spare
37. Technicon NO_x
38. Spare-(Wind Speed)
39. Spare-(Wind Direction)

|1|-|6| - amplified recorder outputs

|7|-|12|- direct recorder output

(Sampling Sequence - Continued)

40.	L & N-SO_2	Operational Mode
41.	Technicon-SO_2	" "
42.	Melpar-SO_2	" "
43.	Philips-SO_2	" "
44.	GC-SO_2/H_2S	" "
45.	Technicon-TO	" "
46.	Kruger-O_3	" "
47.	Gas Phase-O_3	" "
48.	RTI-O_3	" "
49.	Mast-O_3	" "
50.	Technicon-NO_2	" "
51.	Technicon-H_2S	" "
52.	(Not Used)	

53-65 Spare Channels

5.2 Signal Conditioning

The signal conditioning unit houses the necessary bridge circuits, scaling networks, bias voltages, etc., which are utilized in converting or modifying the sensor output signal to a form or level more suitable for recording. Up or down scaling of the signals is sometimes required in order to match the input signal requirements of the analog recorders. In addition, filter networks are incorporated where it is necessary to smooth the signal in order to obtain sampled data that is representative of the preceding sampling interval.

A plug-in card is provided for each signal or data channel in which the scaling and filtering networks are incorporated. There are two signal outputs for each channel; one is tied into the digital recording system and the other into the analog-monitoring or recording system through a front panel located patch panel. Isolation is provided between each of the outputs so that on-line tests may be made without disturbing the digital system signals.

Some test voltages are included for checking the digital recording system as well as monitoring the status of the ± 15 vdc power supplies. The - 0.25 V and + 0.75 V signals are derived from the respective ± 15 vdc supplies, and they provide a means for checking the system at voltages less than ± 1 V. A zero value is also provided by shorting out the respective channel in the digital system scanner.

The system is so designed that channels may be added or deleted without disturbing the digital recording system. This is done by providing for spare channels and using one card per data channel so that these may be removed or replaced as necessary.

5.3 Manual Data Entry

Manual data such as equipment mode or status information is introduced into the system via the manual data entry panel. This unit consists of digital switches which provide different discrete output voltages for each setting of the switch. By utilizing the codes indicated in Table 5.2, status or operational mode information is placed in the respective channels and utilized in the data processing phase to indicate the status of the respective sensors for each scan.

TABLE 5.2

Equipment Status Information

Sensor Mode	SW Setting	Format Symbol
Measure	0	
Calibrate	9	C
Maintenance, Preventive	5	M
Maintenance, Repair	4	R
Off-line (Sensor not available)	6	X
Power-off (or data acquisition system inoperative)	3	F
Analog Recording Only	7	A

A listing of the standard coding for weather is given in Table 5.3; although not utilized in the current study, the facility for automated logging is available.

TABLE 5.3

Weather Coding

Code	Weather State
0	Clear
1	Cloudy
2	Haze
3	Fog
4	Drizzle
5	Rain, Showers
6	Rain, Continuous
7	Thunderstorms
8	Snow, Continuous
9	Snow, Showers

5.4 Analog Recording

Strip chart recorders continuously record the output of each sensor for purposes of visual monitoring, calibration and back-up data recording in case of digital system failure. Properly scaled voltages obtained from the signal conditioning unit are connected to the respective recorders via the patch panel located on the front of the signal conditioning unit.

The test voltages available at the patch panel, (0, 5 mV, 10 mV) provide a means for rapid and accurate checking or calibrating of the individual recorders. In this system, all the signals routed through the patch panel were scaled to 10 mV full scale.

5.5 Digital Recording System

The digital recording system (DYMEC Model 2015 H) consists of a scanner which accepts signal inputs from the meteorological and gas sensors and manual data entries. These analog signals are converted in the analog-to digital (A/D) converter to digital word form. The output of the A/D converter is a binary coded decimal (BCD) of the input and is subsequently recorded in IBM compatible format on the 7-track digital incremental magnetic tape recorder. The system is controlled by the digital clock which also supplies the digital time code. Each data word consists of channel number, polarity of signal, six-digit signal value and range. At the start of each scan (initiated by the digital clock every five minutes) a data word consisting of day-hour-minute is recorded; then the data channels (1 through 65) are recorded in order. The total scan time is approximately 12 seconds.

The accuracy of the analog-to-digital conversion is determined, basically, by the A/D converter, which is on the order of ± 0.01% or better. The A/D converter or digital voltmeter is set for auto-ranging; the lowest range being ± 1.0 V which effectively sets the resolution of the digital word on the signals less than 1.0 V in magnitude. Since it converts to a six-digit data word; i.e., for the 1.0 volt range (1.00000) the smallest change in signal which will produce a change in the digital data word is 10 μV or 0.00001 V. The effective number of digits in the digital data word may be seen to be a function of magnitude of the input signal for all signals less then 1.0 V.

The tape format is set for a 33-word record consisting of 12 characters per word; i.e., 3-channel ID, 1-blank, 1-sign, 6-data, 1-range.

This format combined with the 5-minute scan interval and a magnetic tape packing density of 200 bpi provides for approximately 8.4 days of recording, which allows for a convenient weekly magnetic tape replacement schedule.

A digital printer (or recorder) is provided as a parallel readout for monitoring and test purposes. A sample scan is shown in Figure 5.3. The sampling rate of the system, in this case, is controlled by the fastest rate of the digital printer. Visual displays are incorporated in the system for the channel number, value of data, and time code.

5.6 Power Units

The ac line regulator provides voltage regulated power to all of the digital recording units, sensors and other critical items. As shown in Figure 5.2, a power panel is utilized to monitor the output voltage and frequency of the regulated, unregulated and battery back-up units. In addition, a power off lamp indicates any transient power interruption.

A battery back-up unit provides continuous uninterrupted power (for any ac line power interruptions) to the digital recording system. Thus, in case of power failure or momentary interruption the digital system remains in an operative state--the power being supplied by a battery bank during these periods.

Dc power (i.e. ± 15 V) for various units is provided by the dual power supplies located in the lower part of the rack.

```
Channel  Polarity     Data         Range     Channel  Polarity     Data         Range

3 2  +  0 0 0 0 0 8  5                       6 5  +  0 0 0 0 5 9  5
3 1  +  0 0 0 8 5 6  5                       6 4  +  0 0 0 0 3 8  5
3 0  +  0 3 8 4 5 0  5                       6 3  +  0 0 0 0 6 3  5
2 9  +  0 2 5 1 8 3  5                       6 2  +  0 0 0 0 4 9  5
2 8  -  0 0 0 7 7 4  5                       6 1  +  0 0 0 0 6 4  5
2 7  +  0 0 0 0 0 1  5                       6 0  +  0 0 0 0 7 2  5
2 6  +  0 0 0 0 0 0  5                       5 9  +  0 0 0 0 5 2  5
2 5  +  0 6 9 7 5 8  5                       5 8  +  0 0 0 0 4 4  5
2 4  -  0 0 0 5 9 5  5                       5 7  +  0 0 0 0 6 0  5
2 3  +  0 2 7 2 4 2  5                       5 6  +  0 0 0 0 5 7  5
2 2  +  0 5 2 6 4 9  4                       5 5  +  0 0 0 0 5 2  5
2 1  +  0 6 8 8 5 1  5                       5 4  +  0 0 0 0 4 6  5
2 0  -  0 0 0 0 0 0  5                       5 3  +  0 0 0 0 4 6  5
1 9  +  0 7 4 7 4 2  5                       5 2  +  0 0 0 0 0 1  5
1 8  -  0 2 5 0 5 2  5                       5 1  +  0 6 5 4 2 2  5
1 7  -  0 1 5 0 5 0  3                       5 0  +  0 1 0 5 9 2  5
1 6  +  0 1 5 0 1 4  3                       4 9  +  0 1 0 6 0 0  5
1 5  +  0 6 4 6 0 5  5                       4 8  +  0 7 3 5 5 2  5
1 4  +  0 0 1 1 3 1  5                       4 7  +  0 1 0 5 2 4  5
1 3  +  0 0 0 3 8 5  5                       4 6  +  0 6 5 4 5 9  5
1 2  +  0 6 6 8 2 1  5                       4 5  +  0 1 0 6 0 0  5
1 1  +  0 0 1 7 9 3  5                       4 4  +  0 1 0 5 9 8  5
1 0  +  0 4 4 9 6 3  5                       4 3  +  0 1 0 6 0 3  5
0 9  +  0 0 0 1 4 9  5                       4 2  +  0 1 0 7 2 7  5
0 8  +  0 0 5 5 4 4  5                       4 1  +  0 1 0 6 0 2  5
0 7  +  0 0 0 0 0 0  5                       4 0  +  0 1 0 5 8 5  5
0 6  -  0 0 0 0 0 0  5                       3 9  +  0 0 0 1 6 3  5
0 5  +  0 0 0 0 0 0  5                       3 8  +  0 0 0 1 9 6  5
0 4  +  0 1 0 6 0 8  5                       3 7  +  0 0 0 0 0 9  5
0 3  +  0 1 0 5 0 1  5                       3 6  -  0 1 3 2 9 1  5
0 2  +  0 1 0 5 9 2  5                       3 5  +  0 0 1 4 7 2  5
0 1  +  0 1 0 6 0 0  5                       3 4  -  0 0 0 8 0 6  5
     T    1 1 0 8 5  5                       3 3  +  0 0 0 0 0 0  5
```

Figure 5.3 Sample Digital Printer Output, Single Scan

Daily logs are kept of the power line voltage, frequency and line current; the battery back-up unit voltage and current, etc. An elapsed time meter is included in the power panel. In addition, certain test voltages are sampled each scan and placed on magnetic tape for monitoring of system condition.

The digital clock is synchronized to the 60 Hz line voltage through the battery back-up unit which, in turn, is synchronized to the 115 V, 60 Hz line during normal conditions. During periods of power interruption, an internal 60 Hz frequency standard maintains the proper 115 V, 60 Hz power frequency for the digital clock.

6.0 COMPUTER PROCESSING OF FIELD DATA

Field data may be processed by computer either by real time monitoring of the instrument output or by the method of temporarily storing the data on magnetic tape and later processing the tapes. In this program, data was received weekly from the mobile laboratory in the form of digital voltages on magnetic tape. Processing this data by computer is much more complex than processing normal tape-stored data. This difficulty is attested by the relatively rare demonstration of this procedure. The flow diagram in Figure 6.1 describes the treatment of the data from the time it is received on magnetic tape reels until it is printed out in the various useful forms such as hourly averages, 24-hour averages, etc. The shape of the components in the diagram have some significance. The circles indicate data stored on magnetic tapes. Rectangles indicate program operations. Rectangles with clipped edges indicate card input or output. Parallelograms indicate printed output. Significant details of the computer program are given in the following paragraphs.

6.1 Raw Voltage Dump

This program prints out voltages by channel at times specified by the operator. Field data tapes provide the input. The program also checks instrument mode channels and flags all starting times for calibrating each instrument. Parity errors are monitored and records with such errors are deleted.

6.2 Copy

This program copies the output of Program 6.1 after regrouping the data to insure that each odd record begins with a time channel. Format is checked to insure that two records have been written for each scan.

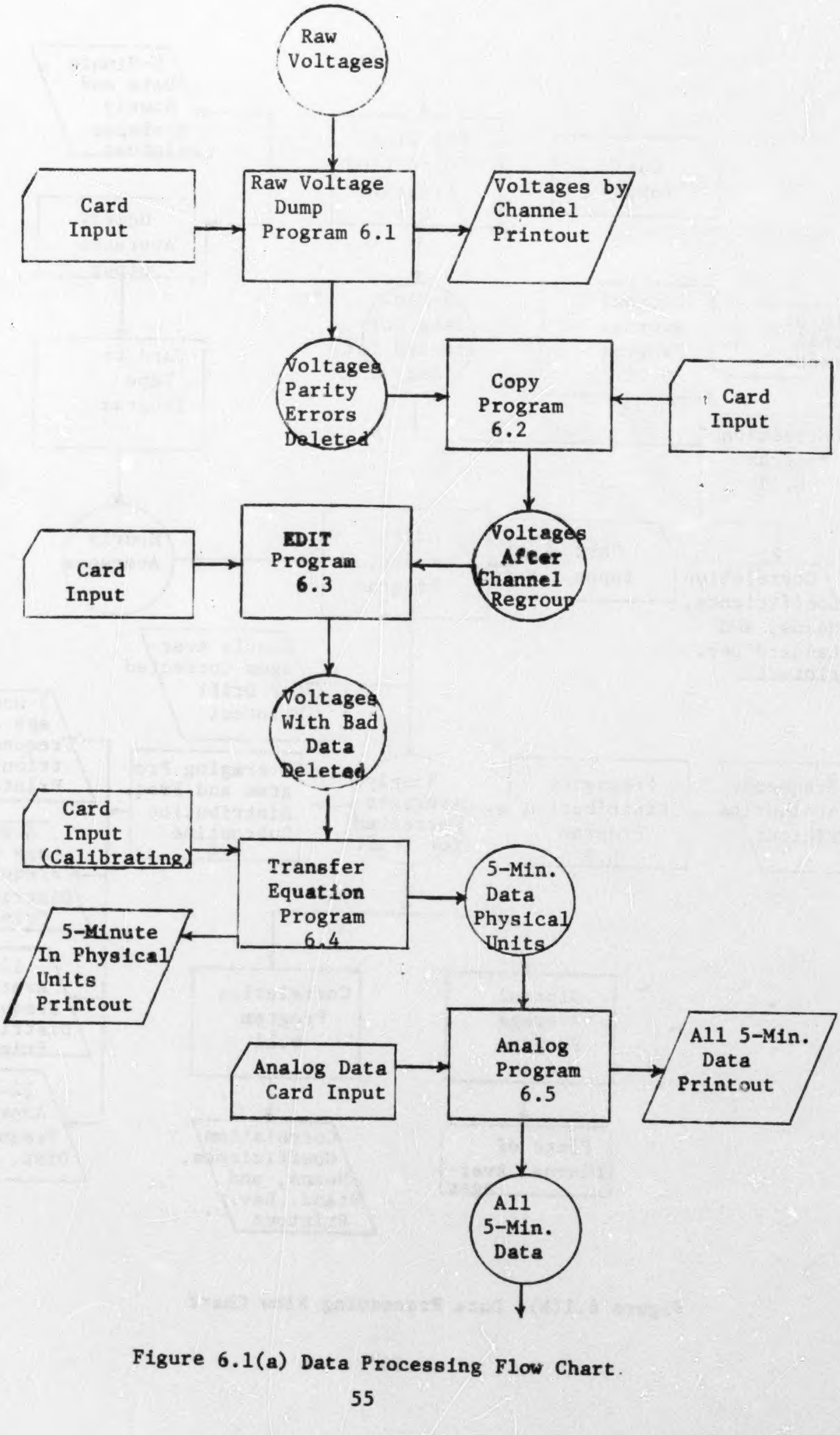
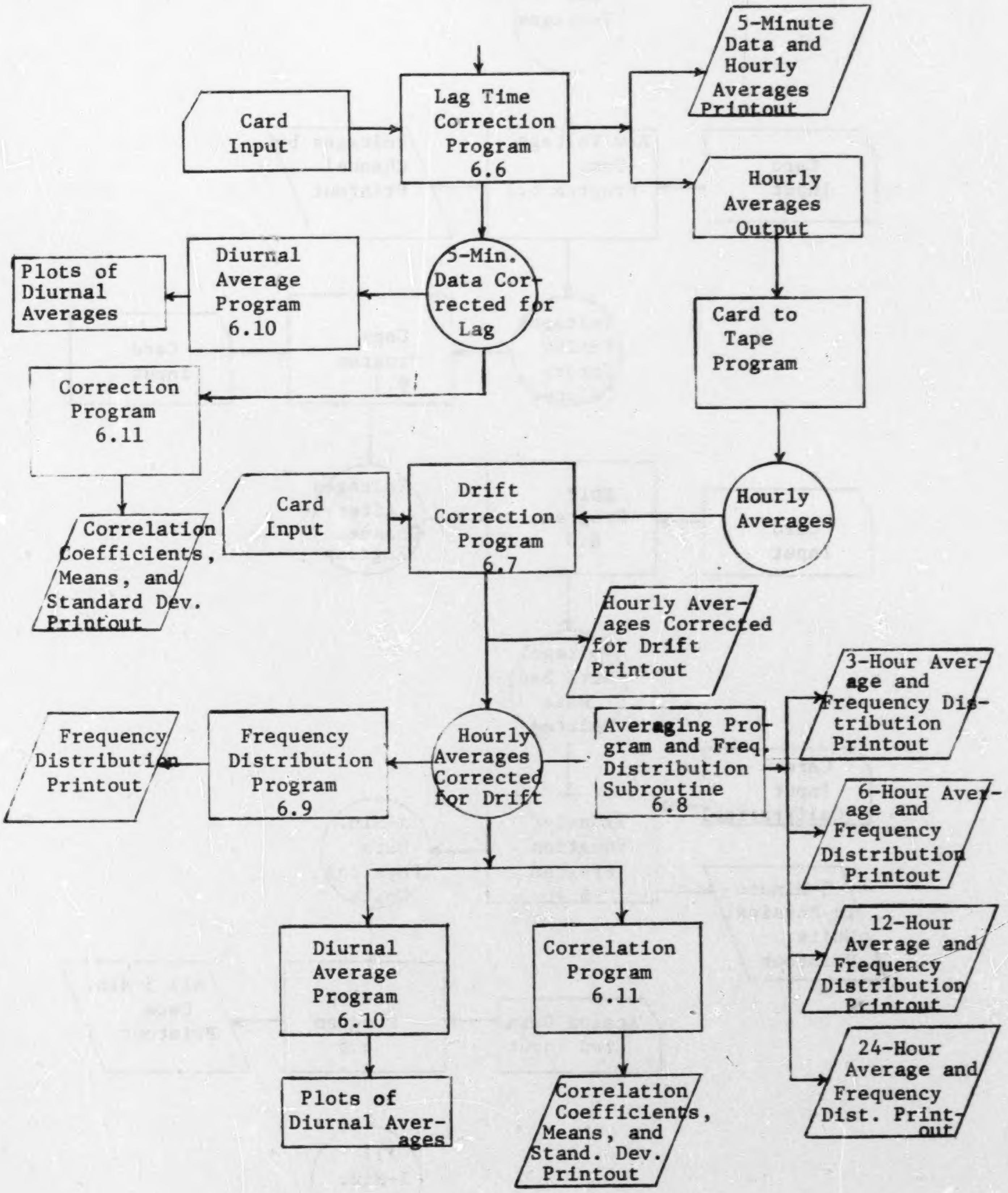

Raw Voltages
Card Input
Raw Voltage Dump Program 6.1
Voltages by Channel Printout
Voltages Parity Errors Deleted
Copy Program 6.2
Card Input
Card Input
EDIT Program 6.3
Voltages After Channel Regroup
Voltages With Bad Data Deleted
Card Input (Calibrating)
Transfer Equation Program 6.4
5-Min. Data Physical Units
5-Minute In Physical Units Printout
Analog Data Card Input
Analog Program 6.5
All 5-Min. Data Printout
All 5-Min. Data

Figure 6.1(a) Data Processing Flow Chart



5-Minute Data and Hourly Averages Printout
Card Input
Lag Time Correction Program 6.6
Hourly Averages Output
Plots of Diurnal Averages
Diurnal Average Program 6.10
5-Min. Data Corrected for Lag
Card to Tape Program
Correction Program 6.11
Card Input
Drift Correction Program 6.7
Hourly Averages
Correlation Coefficients, Means, and Standard Dev. Printout
Hourly Averages Corrected for Drift Printout
3-Hour Average and Frequency Distribution Printout
Frequency Distribution Printout
Frequency Distribution Program 6.9
Hourly Averages Corrected for Drift
Averaging Program and Freq. Distribution Subroutine 6.8
6-Hour Average and Frequency Distribution Printout
12-Hour Average and Frequency Distribution Printout
Diurnal Average Program 6.10
Correlation Program 6.11
24-Hour Average and Frequency Dist. Printout
Plots of Diurnal Averages
Correlation Coefficients, Means, and Stand. Dev. Printout

Figure 6.1(b) Data Processing Flow Chart

6.3 Edit

The output of 6.2 is copied after correcting for time that does not correspond to a five-minute interval. Faulty data is substituted by a missing indicator (e.g. overload voltage). Scans with a duplicate channel or channels out of order are deleted, as well as records with time that is earlier than the time on the previous scan (faulty time record).

6.4 Transfer Functions

The calibration data for each instrument is programmed as a transfer equation to convert voltages to physical units. This program also writes a tape and prints out the five-minute data along with manual entry modes with two hours of data per page. Two basic equations are used: a logarithmic function of the form ppm is equal to $a(V - b)^n$ for the Melpar and Tracor Instruments and a linear function of the form ppm is equal to $a(V) + b$ for all other instruments.

6.5 Analog Input

During most of the study in Los Angeles, the Solid Phase Chemiluminescent instrument and the GC-FPD instruments were recorder on strip charts. This program merges the strip chart data that has been punched on cards with output from Program 6.4. A new tape is written containing the complete data set. The five-minute data and modes are printed out with two hours of data per page.

6.6 Lag Time Correction

The output from those instruments having a lag time greater than five minutes is shifted in time accordingly. Hourly averages are calculated and punched on cards. The averages are also printed with the five-minute data in the same form as Program 6.5. The program also prints an estimate of the ozone value that is derived from the oxidant measurements corrected for NO_2 and SO_2 interference. The following equations are used:

$$0_3T = \text{TECH 0X.} - C_1\ (\text{TECH N02}) + C_2\ (\text{TECH S02})$$

$$0_3M = \text{MAST 0X.} - C_3\ (\text{TECH N02}) + C_4\ (\text{TRAC0R S02})$$

where C_1, C_2, C_3 and C_4 are constants determined by interference tests.

6.7 Drift Correction

Using a tape created from cards containing hourly averages (output from 6.6), this program calculates calibration drift corrections and applies them to the hourly data. Average SO_2 and oxidant values are computed. This data is written on tape and printed out with one page of data per day.

6.8 Averaging

Average values are calculated for four different averaging time periods for all data output from program 6.7. These periods are three-hour, six-hour, twelve-hour, and twenty-four hour averages. The average wind directions are computed using components of the wind direction unit vector, however, wind speeds are not used in the calculation.

6.9 Frequency Distribution

The frequency distributions are calculated for specified sensors using the tape output from 6.7. The percent of hourly data above various concentration levels is printed. This program is also used as a sub-routine of program 6.8 to obtain frequency distributions of data averages for other time periods.

6.10 Diurnal Averages

The hourly data output from 6.6 is used to calculate monthly diurnal averages and standard deviations for each gas having valid data for each of the twenty-four hours in a day. The twenty-four hour averages for each sensor are plotted with a standard deviation and case count included. The process is repeated for data output from 6.7.

6.11 Correlations

Using the output from 6.6, the program correlates selected pairs of sensors for all hours when both sensors have valid data. Each of these data sets is used to calculate a mean and standard deviation for the time period between tape changes in the van (approximately one week). The process is repeated for data output from program 6.7.

7.0 INSTRUMENT EVALUATION

A general set of performance criteria can be established which are independent of the type of instrument being evaluated or the application in which it is to be used. This approach should have a wider audience than an evaluation based on the minimum criteria and standards for a specific application. Keeping in mind that the user of evaluation data has a specific application in mind, this case must be easily derived from the general case. Performance criteria based on instrument characteristics have this general applicability.

The air quality data in the Appendices is a necessary part of the evaluation because of the many unknowns involved in sampling a variety of real atmospheres. The evaluation of ambient air monitors is incomplete until several instruments are observed simultaneously under the same field conditions. In Sections 7.1 and 7.2, this is called field data quality. Other major categories of instrument characteristics are physical characteristics, test procedure responses, and functional capability. Terms are described in Section 7.1 and experimental data analysis is provided in Section 7.2. A linear decision model is presented in Section 7.3 followed by a general performance summary in Section 7.4.

7.1 Definitions of Performance Criteria

7.1.1 Physical Characteristics

Portability: Measure of the capability to be moved. Small size and low weight are desirable. Durability as well as shape may also enter into the assessment of portability. For the Los Angeles study, size and weight are sufficient descriptors.

Size: The dimensions of the complete instrument. Height, width and depth are usually adequate to describe size. The basic instrument is assumed to include the sampling, analysis, and detection systems, in one or more packages. Data display, recording systems, pumps, and reagent containers are considered accessories unless they are an integral part of the instrument in a single cabinet.

Weight: Low weight is desirable, although its importance may vary between one user and another. It is a significant measurable characteristic related to portability.

Space Requirement: The dimensions of height, width and depth required for installation, operation, and maintenance of an instrument. It includes space needed by auxiliary items and equipment, and includes swinging space for cabinet access doors and panels. This characteristic has a general relationship to size.

Auxiliary Equipment: Additional equipment required by the instrument to perform its measurement and data display function. The need for auxiliary equipment is undesirable.

Power Requirement: The type of power and the amount required for operation. High power consumption is expensive and often requires facility cooling as well as instrument cooling equipment.

Versatility: The capabilities of being used for more than one purpose; a multi-component analyzer is inherently more desirable than the single component analyzer. For application to a specific gas, however, this would be unimportant.

Hazards: Sources of irritation or harm to the instrument operator or other personnel which are related to the proper function of the instrument. Typical hazards are chemical, electrical, optical, and acoustical in nature.

7.1.2 Measured Responses to Standard Test Procedures

Temperature Effect: The change in instrument output per unit temperature change. This is an important performance characteristic but very little data was obtained during the Los Angeles study.

Interference: The positive or negative output caused by a substance other than the one being measured. (See Interference Equivalent).

Interference Equivalent: The indicated concentration of one pollutant which is attributable to a given concentration of an interferent. A low interference equivalent is desired for those interferences which are likely to be found in the instrument environment.

Volumetric Flow Rate: The volume of sample air passing through the instrument per unit time. This parameter may be particularly important where the sampling system is already designed and cannot be altered.

Range: The minimum and maximum measurement limits. The effective range may be limited by the points where no readable response can be obtained. A more useful, effective range in analytical instrumentation is the range over which a single calibration curve gives sufficient calibration precision. This specification is of primary importance in matching an instrument and a specific measurement problem.

Set-up Time: The time required to prepare the instrument for operation after it has been transported from one location to another.

Warm-up Time: The time required for the instrument drift rate to be within the maximum limit specified for the instrument after having been shutdown for at least 24 hours.

Response Time: The time required for the instrument to reach a new equilibrium. The important components of response time are defined below and further clarified by a graphical presentation, Figure 7.1.

Initial Response Time (Lag Time), t_i: The time interval from a step change in the input concentration at the instrument inlet to the first corresponding change in the instrument output. This can be most reproducibly determined by extrapolating the slope at the 5% point.

Rise Time, t_r: The interval between the initial response time (t_i), and the time to 95% response (t_{95}), after a step increase to inlet concentration.

Time to 95% Response, t_{95}: The time interval from the step change in the input concentration at the instrument inlet to a reading of 95% of the equilibrium concentration; t_{95} is equal to t_i plus t_r, there is no additional information in this term, but it is more convenient to determine than t_i and has more practical significance.

Fall Time, t_f: The interval between the initial response time, t_i and the time to 95% response after a step decrease in the inlet concentration. This time is not necessarily equal to the rise time, but may be approximately the same.

Speed of Measurement: The time required to set up the instrument, calibrate, make the measurement, and perform any analysis necessary to present the instrument output at standard units. Although not very significant to continuous monitoring functions, this aspect of performance could be very important for such things as short-term site monitoring.

Sensitivity: Instrument output per unit input. The term is important in system design, but other terms describe system performance better. (Minimum detectable change, minimum detectable sensitivity, decision limit, detection limit, precision).

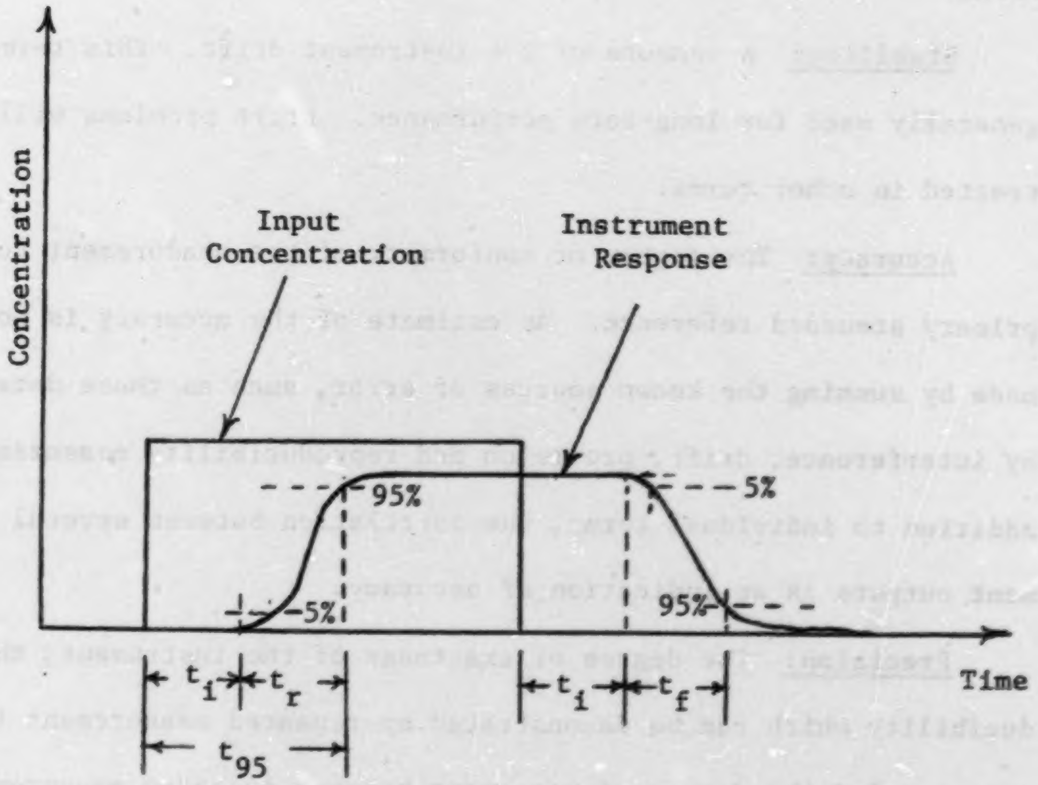

Concentration
Input Concentration
Instrument Response
95%
5%
-5%
95%
t_i
t_r
t_{95}
t_i
t_f
Time

Figure 7.1 Instrument Response Time

7.1.3 Data Quality Determined for Field Evaluation

Calibration Requirements: The time between calibrations, the time required to perform individual calibrations, the difficulty in using available standards, hysteresis effects and non-linear response. Terms other than standard source requirements and the time required for calibrations are considered in other accuracy-related terms.

Stability: A measure of the instrument drift. This term is generally used for long-term performance. Drift problems will be treated in other terms.

Accuracy: The degree of conformity of the measurement to a primary standard reference. An estimate of the accuracy is normally made by summing the known sources of error, such as those determined by interference, drift, precision and reproducibility measurements. In addition to individual terms, the correlation between several instrument outputs is an indication of accuracy.

Precision: The degree of exactness of the instrument; the reproducibility which can be demonstrated by repeated measurement from the same sample; the degree of agreement between repeated measurement of the same concentration expressed as the average deviation of the single results from the mean.

Calibration Precision: The variance of calibration data about the best fit calibration curve.

Zero Drift: The change in instrument output over a stated time period. Data with which to estimate this drift can be obtained through unadjusted, continuous operation, with zero air, or it may be obtained by comparison of successive calibration data. Minimum zero drift is desirable especially when measuring very low concentrations.

Span Drift: The change in instrument response over a stated period of time. Data with which to estimate this drift may be obtained through unadjusted, continuous operation or it may be obtained by comparison of successive calibration data. The minimum span drift will improve reproducibility, especially at higher concentration levels.

Linearity: The maximum deviation between an actual instrument reading and the reading predicted by straight line calibration drawn over the extent of its range. A linear response results in easier calibration.

Reproducibility: The attainability of the same output for a fixed input measured at intervals over a period of time. Estimates of this reproducibility may be influenced by the reproducibility of the calibration system.

Calibration Reproducibility: The variance between calibration data obtained in different times during the instrument operation period.

Minimum Detectable Sensitivity: The smallest amount of input concentration which can be detected with a specified degree of confidence. The statistical calculation of decision limit or detection limit from calibration data provides an unambiguous measure of the sensitivity. Much of the same information is contained in the zero drift and precision data.

Minimum Detectable Change: The smallest change of input concentration which can be detected at a given operating level. The equivalent information for this term is given by zero and span drift and are best represented by confidence limits on the calibration curve. The minimum detectable change is estimated by the difference $y_{max} - y_{min}$ in Figure 7.2.

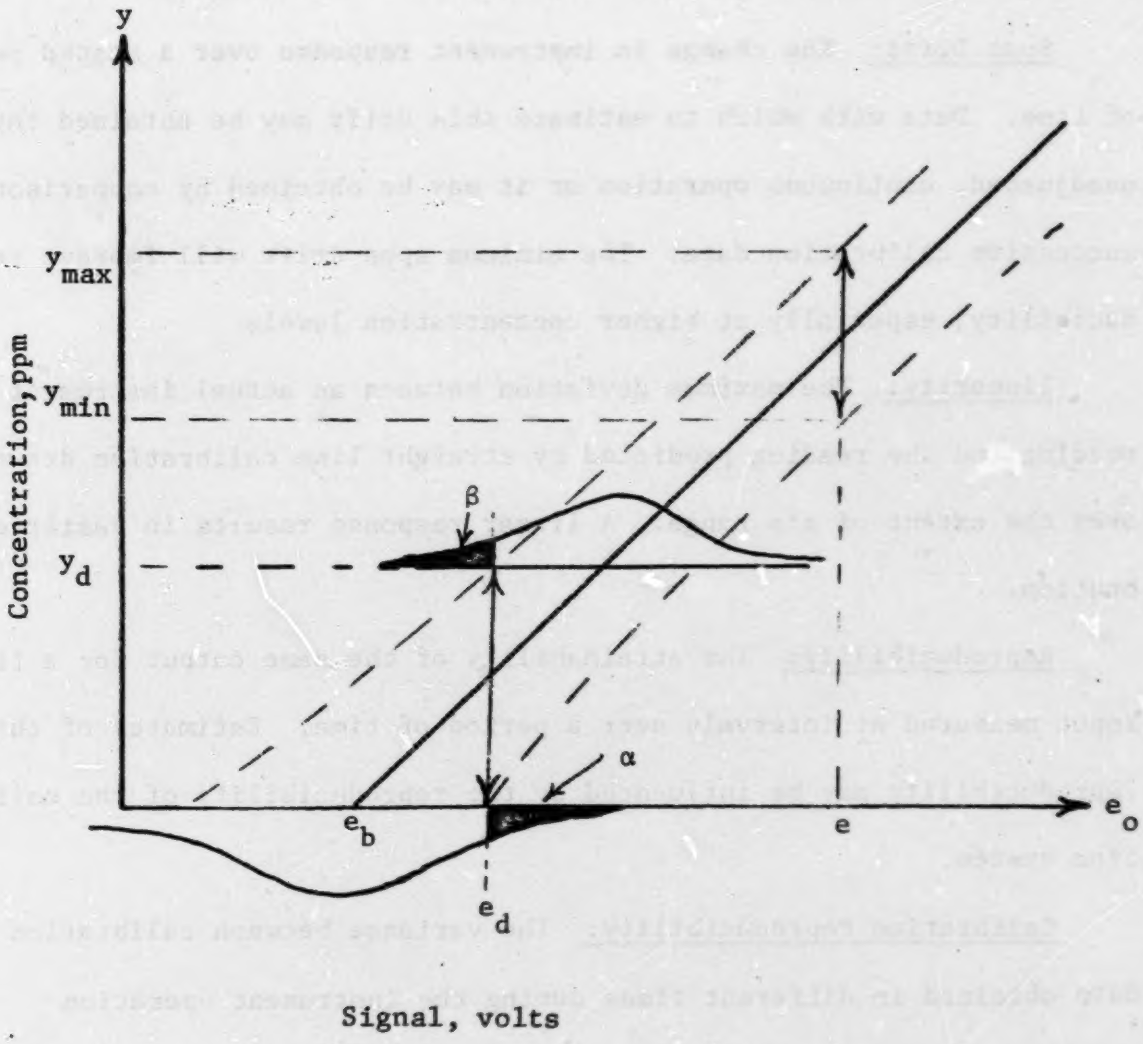

y
y_{max}
y_{min}
y_d
Concentration, ppm
β
α
e_b
e_d
e
e_o
Signal, volts

Figure 7.2. Transfer Function with Confidence Limits. e_d and y_d are the decision limit and the detection limit used by, Hubaux and Vos [17].

Decision Limit: The lowest signal that can be distinguished from background with a specified degree of statistical confidence.

Detection Limit: The concentration below which there is a specified probability that the sample may erroneously be taken for a blank.

The confidence limits shown in Figure 7.2 are determined by the dispersion of calibration data about a linear calibration curve. The signal from a blank sample has a probability of 1-α of being less than the decision limit, e_d. For an input concentration equal to the detection limit y_d, there is a small probability, β, that it will be taken as a blank. This concentration has a chance, 1-β, (expressed in percent of confidence), that it will be taken as non-zero.

7.1.4 Functional Capability Determined by Field Monitoring Experience

Fragility: The delicacy of the instrument and the need for careful handling. Rugged instruments are preferred.

Durability: Ability to withstand normal use. This term is related to fragility under normal operating conditions.

Serviceability: Ease of which an instrument can be serviced and repaired. Long periods of repair indicate poor performance. Additional subjective judgment by the person performing the maintenance and repair is necessary in the evaluation.

Zero Failure Period: The mean time between failures. The record of field operation can provide the necessary data. Conclusions must be statistically qualified by the number of instruments being observed and the length of the observation period.

Maintenance Requirements: The frequency and severity of problem preventing proper operation of the instrument. The best estimate of this performance is the percentage of available time spent in maintenance. Parts and operator time are considered under cost.

Operational Period: The mean time over which the instrument can be expected to operate without maintenance recalibration or adjustment.

Equipment Cost: The cost of buying the instrument (capital cost), operating cost (reagents, recording paper) and maintenance cost (spare parts, repair time). These three types of costs could be evaluated independently depending upon the economic needs of the user. Generally, however, the lowest total cost would be the basis for selection.

7.2 Experimental Performance Data

7.2.1 Physical Characteristics

Although physical characteristics can be very important in the selection of instruments, they are not as complex, and differences which may be critical are solved quickly.

Power requirements are listed for each instrument in Table 7.1 along with physical dimensions and weight. The CSM6 is the largest in all categories but it includes six channels. The Mast instrument is the smallest and least power consuming.

Versatility is considered in Table 7.2. The practical significance of measuring more than one pollutant depends on each unique situation.

A hazards analysis is given in Table 7.3. Although the hazards can be handled very easily, they must always receive proper attention.

Table 7.1 Physical Characteristics

Instrument	Height (In.)	Width (In.)	Depth (In.)	Weight (Lbs.)	Power (Watts)
Solid Phase Chemi O_3	18.5	19.8	23.0	133.0	290
Gas Phase Chemi O_3	26.0	19.0	18.0	49.0	125
Mast	11.5	7.5	6.0	10.5	12
Melpar - SO_2	11.5	11.0	20.0	28.0	200
Air Pump	5.0	4.0	7.0	7.0	70
Cylinder of Hydrogen	52.0	9.0	9.0	136.0	
Philips - SO_2					
Electrical Unit	18.0	24.0	11.0	42.0	180
Chemical Unit	18.0	24.0	11.0	26.0	
Leeds & Northrup - SO_2	30.5	18.0	10.0	85.0	1350 S 450 R
Reagent Storage Container	20.0	11.5	11.5	30.0	
Wet Test Meter	19.0	13.0	10.0	20.0	
Tracor - H_2S, SO_2, CH_3SH	17.8	19.0	28.0	97.0	340
Air Pump	6.3	10.0	3.5	6.5	3.3
Cylinders					
Hydrogen	52.0	9.0	9.0	136.0	
Oxygen	52.0	9.0	9.0	153.0	
Nitrogen	52.0	9.0	9.0	149.0	
Air	52.0	9.0	9.0	151.0	
Technicon CSM6	75.0	57.0	35.0	750.0	3300

S - Starting

R - Run

Table 7.2 Versatility Analysis

Instrument	Versatility Rating*
Solid Phase Chemi O_3	1
Gas Phase Chemi O_3	1
Mast	1
Melpar - SO_2	1
Philips - SO_2	1
Leeds & Northup - SO_2	1
Tracor - H_2S, SO_2, CH_3SH	3
Technicon CSM6	3
Channel 1 SO_2	2
Channel 2 NO_2	2
Channel 3 NO_x	2
Channel 4 HCOH	2
Channel 5 $T.O_x$	2
Channel 6 H_2S	2

*1 - Can measure one pollutant

2 - Can be modified to measure a different pollutant

3 - Can measure more than one pollutant

Table 7.3 Hazards Analysis

Instrument	Operational Hazard	Maintenance Hazard
Solid Phase Chemi O_3	-	High Voltage
Gas Phase Chemi O_3	Ethylene	High Voltage
Mast	-	-
Technicon Total Oxidant	-	-
Technicon - SO_2	Mercury Waste	-
Melpar - SO_2	Hydrogen	-
Philips - SO_2	-	Acid Electrolyte
Leeds and Northup - SO_2	-	-
Tracor-GC-H_2S, SO_2	Hydrogen	-
Technicon - H_2S	-	-
Technicon - NO_2	-	-

7.2.2 Measured Responses to Standard Test Procedures

Instrument response times are shown in Table 7.4. Response times are used to adjust the output data as an integral number of scans based on the nearest five-minute interval. For instance, instruments having a time to 95% response between 2.5 and 7.5 minutes are displaced by one five-minute scan interval.

Operating ranges are shown in Table 7.5. The appearance of more than one range indicates that range adjustments were made during the study period.

The volumetric flow rate requirements for each instrument are given in Table 7.6. Flow rate is of concern in two major design areas: flow capacity of sample lines and cost of gas supplies.

Table 7.4 Instrument Response Times

Instrument	Set-Up Time (min)	Warm-Up Time (hours)	Lag Time (min)	Rise Time (min)	t_{95} (min)
Solid Phase Chemi O_3	20	0.5	4.0	n/a	4.0
Gas Phase Chemi O_3	120	0.5	0.2	1.0	1.2
Mast	45	1.0	1.0	1.0	2.0
Technicon Total Oxidant	60	1.0	15.0	9.0	24
Technicon - SO_2	60	1.0	25	9.0	34
Melpar - SO_2	60	1.0	0.1	1.0*	1.1*
Philips - SO_2	30	0.5	2.0	1.0	3.0
Leeds and Northrup - SO_2	90	2.5	1.0	5.0	6.0
Tracor GC - H_2S, SO_2, CH_3SH	120	8.0	3.0	n/a	3.0
Technicon - H_2S	60	1.0	21.0	14.0	35.0
Technicon NO_2	90	1.0	20.0	18.0	38.0

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* Longer times that are concentration dependent have been observed to result from a dirty detector unit.

n/a--not applicable

Table 7.5 Instrument Operating Range

Instrument	Range (ppm)
Solid Phase Chemi O_3	0 - 0.5
Gas Phase Chemi O_3	0 - 0.5
Mast O_x	0-0.1, 0-1.0
Technicon Total Oxidant	0-0.1, 0-1.0
Technicon - SO_2	0-0.1, 0-1.0
Melpar - SO_2	0 - 1.0
Philips - SO_2	0-0.1, 0-1.0, 0-3.0
Leeds and Northup - SO_2	0-1.0, 0-2.0
Tracor GC - H_2S, SO_2, CH_3SH	0 - 0.8
Technicon - H_2S	0 - 0.17
Technicon NO_2	0-0.1, 0-1.0

Table 7.6 Volumetric Flow Rate Requirements of Ambient Air Monitors

Instrument	Flow Rate (liter per minute)
Solid Phase Chemi O_3	0.20
Gas Phase Chemi O_3	1.0
Mast	0.14
Technicon Total Oxidant	0.51
Technicon - SO_2	0.404
Melpar - SO_2	0.20
Philips - SO_2	0.15
Leeds and Northup - SO_2	2.36
Tracor GC - H_2S, SO_2, CH_3SH	0.010
Technicon - H_2S	0.76
Technicon - NO_2	0.315

7.2.3 Field Data Quality

In section 7.1.3 the terms that are defined are concerned with calibration requirements, stability, accuracy and limits of detection. Performance data related to these terms could be obtained in the laboratory but generally it is more credible when it is obtained under field conditions that closely simulate the intended operating conditions of the instrument.

A summary of calibration experience for each instrument during the Los Angeles study is shown in Table 7.7. The calibration parameters that are listed describe response curves of the form

$$y = mx + b$$

and

$$y = a(x-x_o)^n.$$

The number of calibrations during the period are listed with the average. A small number of calibrations is indicative of using more than one instrument of that type, changing scales during the period, or the instrument being unavailable part of the time. From this basic data the average drift and standard deviation of drift are determined. The percent drift ratio is the ratio of the standard deviation of drift to the standard deviation of the average value. If this ratio is near 100%, it indicates that not much is to be gained by continuous drift corrections. Where zero and span adjustments were made (see notes to Table 7.7), this interpretation is distorted.

From a statistical view, additional information is contained in the correlation coefficient of calibration data. These results are shown in

Table 7.7 Statistical Summary of Calibration Data from the Los Angeles Study

Instrument	Parameter	Average Value	Standard Deviation	Standard Deviation as Percent of Average	Number of Calibrations	Average Drift per Day	Percent Drift per Day	Standard Deviation of Drift	Percent Drift Ratio (3)
Solid Phase(1)	m	0.107	0.00849	7.9	23	-0.00053	-0.5	0.00592	69.7
Gas Phase (All)	m	0.541	0.112	20.7	20	0.00714	1.32	0.0449	40.1
	b	-.01334	0.01110		20	-0.0005		0.00410	
Gas Phase (9/28-12/1)	m	0.4846	0.02132	4.4	9	0.00343	.70	0.00821	38.5
	b	-.00356	0.00230		9	0.00007		0.00055	
Mast (2) (9/4-9/26)	m	52.348	2.435	4.6	15	-0.702	-1.34	2.1630	88.8
	b	-.00034	0.00117		8	0.0001		0.0005	
Mast (2) (9/26-12/1)	m	67.664	4.557	6.7	9	1.484	2.19	3.218	70.6
	b	-.00050	0.00240		9	-0.0005		0.0045	
Technicon O_x(6) (9/22-12/1)	m	0.09733	0.00861	8.8	10	0.00148	1.52	0.00927	107.7
	b	-.00709	0.01365		12	-0.00014		0.01977	
Technicon SO_2(6)	m	0.0241	0.0062	25.7	23	-0.00039	-1.62	0.00577	93.1
	b	-.00678	0.00841		23	-0.00013		0.01005	
Melpar SO_2 (9/23-12/1)	x_o	0.00684	0.00402		12	0.00009		0.00188	
	a	0.137	0.0164	12.0	12	-0.00149	-1.08	0.00663	40.4
	n	0.654	0.0526	8.0	12	0.00057	0.087	0.00260	4.9
Philips SO_2	m	18.561	2.691	14.5	24	-0.367	1.97	3.538	131.5
	b	-.10155	0.02378		24	0.00456		0.0268	
L & N SO_2	m	0.300	0.0918	30.6	20	-0.0131	4.3	0.0493	53.7
	b	-.001	0.00371			0.00044		0.00191	
GC-FPD (SO_2)(1)	a	0.0242	0.0052	21.4	20	-0.00115	-4.75	0.00250	48.1
	n	0.5929	0.0668	11.2	7	-0.00493	- .83	0.00838	12.6

Table 7.7 Statistical Summary of Calibration Data from the Los Angeles Study (Cont.)

Instrument	Parameter	Average Value	Standard Deviation	Standard Deviation as Percent of Average	Number of Calibrations	Average Drift per day	Percent Drift per day	Standard Deviation of Drift	Percent Drift Ratio(3
Tracor-SO_2	a	0.2588	0.0368	14.2	4	-0.0050	- 1.93	0.01114	30.2
	n	0.5295	0.1146	21.6	4	-0.0052	- .98	0.00936	8.2
	x_o	0.0504	0.0019	--	5	-0.00026		0.00071	
Tech NO_2 (6) (All)	m					-0.00038	- .35	0.00302	19.7
	b					0.00018		0.01281	
Tech NO_2 (4) (9/4-9/30)	m	0.10840	0.01534	14.1	9				
	b	-.016558	0.01919	--	8				
Tech NO_2 (5) (9/30-12/1)	m	0.20153	0.01059	5.2	6				
	b	-.01009	0.04108	--	14				
Tech H_2S	m	0.02153	0.00199	9.2	3	0.00030	1.39	0.00071	35.7
	b	-.00305	0.00261	--	8	0.00046		0.00086	
Tracor H_2S	a	0.2450	0.0402	16.4	4	-0.0057	- 2.32	0.0103	25.6
	n	0.5583	0.0635	11.4	4	0.0004	.07	0.0111	17.5
	x_o	0.0677	0.0017	--	4	0.00007		0.00035	

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(1) Data from analog recorder.
(2) First instrument was replaced on 9/26/70.
(3) Ratio of standard deviation of drift per day to the standard deviation of individual calibrations in percent.
(4) 0.5 ppm full scale.
(5) 1.0 ppm full scale.
(6) Zero and span adjustments were made.

Table 7.8. The last column is the result of using a single calibration curve to fit all the calibration data for the Los Angeles study. The first column is the result of a single calibration obtained after the instruments returned to home base from the Los Angeles site. The second column is a second calibration performed after six days of operation. The third column uses an average curve to fit the data of the previous two columns.

The reproducibility at several concentrations is shown in Table 7.9. The standard deviation about zero is roughly equivalent to the detection limit with 80% confidence on a long-term basis. The standard deviation about the higher concentrations is equal to the minimum detectable change at the point of measurement on a long-term basis (roughly 65% confidence depending upon the number of observations). On a short-term basis, the variability would be expected to be much less. This broadening effect with time is indicated by the reduction in correlation coefficients for the longer time periods in Table 7.8. Factors that are used to assess the minimum detectable sensitivity and minimum detectable change can thus be seen to depend upon the testing conditions.

Table 7.8 Calibration Data Correlation

Instrument	Correlation Coefficients			
	January 18, 1971	January 22, 1971	January 18 and 22, 1971	3 Months September 5- December 1, 1970
Solid Phase Chemi-O_3	.9994	.9986	.9968	(2)
Gas Phase Chemi-O_3	.9994	.9993	.9989	.9800
Mast - Total Oxidant	.9960	.9989	.9770	.9975
Technicon - Total Oxidant				.9982(1)
Technicon - SO_2				.9825(1)
Melpar - SO_2	.9979			
Philips - SO_2	.9994	.9997	.9742	.9270
Leeds and Northrup - SO_2	.9977	.9948	.9275	.9540
GC-FPD - SO_2, H_2S	.9999	.9809	.9860	.9575
Technicon - H_2S				
Technicon - NO_2				.9939(1)

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(1) Zero and span adjustments were made during the period operation.

(2) Three-month data is not comparable to January data because of instrument modification to permit automatic data acquisition.

Table 7.9 Standard Deviation of Calibration Data for a Period of 90 days at Several Concentrations.

	OZONE			OXIDANT		SULFUR DIOXIDE					NITROGEN DIOXIDE
Concentration ppm	Chem. (2)	Gas Ph. (All)	Gas Ph. (Sept. 28 to Dec. 1)	Coul.	Color (1)	Color (1)	FPD	Coul.	Cond.	GC-FPD (2)	Color (1)
0	NA	.0081	.0009	.0009	NA	.0073	.0045- .004	.012	~.001	NA	NA
.021						.0045	.0035- .0055	.0095	.007	.0038- .0045	
.04						.0029	.004	.0135	.014	.006- .007	
.08						.0031	.005	.0125	.011	.010- .012	
0.1	.0023	.0057	.0034	.0027	~.010						
0.2	.0157	.0152	.0176	.0201	~.010						
0.35	.0215	.0661	.0035	.0187	~.010						
0.4											.071 (Before September 25) .035 (After September 25)

(1) Zero and span adjustments were made

(2) Baseline subtracted on strip chart

7.2.4 Functional Capability

The most obvious negative functional characteristic is instrument failure. The number of failures that occurred for each instrument in Los Angeles is shown in Table 7.10. The inverse or the period divided by the number of failures gives what has been defined as the zero failure period. All instruments experienced at least one failure except the Tracor which was only operational for one month. The Technicon total oxidant channel was the most troublesome with five failures.

Other operational features are indicated in Table 7.11. The percentage of time in each mode was obtained from the daily operator log and the mode channel data stored on magnetic tape. Satisfactory operation of the instruments resulted in better than 90% of the time in the sampling mode. The low value for the Technicon-H_2S channel resulted from delay in receiving a new logarithmic amplifier.

Emphasis on functional capability of continuous air monitors results from their ultimate contribution to instrument operating costs. The total cost of each instrument must be determined from the operating costs for a specific application plus the original purchase price. Approximate prices are given in Table 7.12 with the realization that they are subject to change.

Table 7.10 Instrument Failures

Instrument	Number of Failures for Three-Month Period
Solid Phase Chemi O_3	1
Gas Phase Chemi O_3	1
Mast	1
Technicon - Total Oxidant	5
Technicon - SO_2	2
Melpar - SO_2	1
Philips - SO_2	1
Leeds and Northrup - SO_2	2
Tracor GC - H_2S, SO_2 (one month)	0
Technicon - H_2S	2
Technicon - NO_2	2

Table 7.11 Operational Summary

	Operational Modes (Percent Time)						
Instrument	Calibration	Maintenance	Awaiting Maintenance	Repairs	Miscellaneous Downtime[1]	Off-Line[2]	Sampling
Solid Phase Chemi O_3	3.2	0	0	0.04	2.9	6.1	93.9
Gas Phase Chemi O_3	3.5	0	0	0.3	3.4	7.2	92.8
Mast- Total Oxidant	3.5	0	0	1.1	3.4	8.0	92.0
Technicon - Total Oxidant	7.2	1.0	3.5	1.2	6.2	19.1	80.9
Technicon - SO_2	4.0	3.1	1.9	4.5	12.1[3]	25.6	74.4
Melpar - SO_2	3.0	0.13	0	0.09	2.9	6.1	93.9
Philips - SO_2	2.7	0[4]	0	0.04	7.7	10.4	89.6
Leeds and Northup - SO_2	2.9	0	0	1.1	4.1	8.1	91.9
GC-FPD - H_2S, SO_2	2.9	0.09	0	0	4.1	7.1	92.9
Technicon - H_2S	1.9	9.4	0.4	1.3	39.7[3]	52.7	47.3
Technicon - NO_2	3.6	2.8	2.1	5.5	7.6	21.6	78.4

[1] Miscellaneous Downtime Includes:

(a) Awaiting reagents, repair parts

(b) Downtime attributed to bad reagents supplied by Technicon (H_2S only)

(c) Instrument Modifications

[2] Off-Line Means Instrument Not in Monitoring Mode

[3] Logarithmic Amplifier Failed

[4] Maintenance Recommended at 90-day Intervals (3 hours required)

Table 7.12 Instrument Costs

	Total	Cost/parameter
Solid Phase Chemi O_3	\$3,900[1]	\$3,900
Gas Phase Chemi O_3	3,500[1]	3,500
Mast	950	950
Melpar - SO_2	3,750	3,750
Philips - SO_2	5,290	5,290
Leeds & Northrup - SO_2	2,670	2,670
Tracor H_2S, SO_2, CH_3SH	12,000[2]	4,000
Technicon CSM-6	27,000[3]	4,500[4]

[1] Estimated production cost

[2] 3 parameters (H_2S, SO_2, CH_3SH)

[3] 6 parameters (SO_2, O_x, NO, NO_2 H_2S, CHOH)

[4] includes recorder

7.3 A Linearly Weighted Decision Model

Evaluation of a group of instruments to perform a specific measurement task is a complex procedure. In actual practice, it involves testing each instrument to determine if it passes certain critical (or minimum) performance requirements, one or more than may involve cost, and then depending upon the intuition of an experienced engineer, to resolve the lesser points of difference between those which are acceptable. The procedure is obviously simpler when a group of nominally acceptable instruments is to be classified rather than when the decision must be narrowed to an instrument for immedicate purchase. Other intermediate situations can be visualized as well.

In a recent report by the Department of the Army, a logical procedure was outlined to successively consider critical performance factors, relative performance factors, cost procedure items, and subjective factors. The above report also includes many procedure and data forms that may be included in some of our later evaluations.

The following instrument evaluation model is developed around the concept of performing separate evaluations for each performance characteristic to determine relative performance and then applying a weight to each characteristic depending on how critical it is for the particular measurement problem. The advantages are that the relative performance need be determined only once for any subsequent application. The major disadvantage lies in the problem of quantitatively equating test results to relative performance and equating critical requirements to weight factors. Additional work needs to be done in this area.

The value of a method for a measurement problem is given by

$$V_j = W_i P_{ij}$$

where P_{ij} is the probability that method "j" is the best method as determined by the characteristic "i". W_i is a weighting factor, or the probability that the characteristic "i" is the most important performance parameter. As an example to aid in understanding larger matrices, consider the smaller problem of two methods, say automated colorimetry and coulometry, which are to be evaluated on the basis of two performance requirements; namely, accuracy and portability.

A comparison matrix is first set up which contains as much available data and subjective judgment as is needed to begin the evaluation This is demonstrated is Table 7.13. For a large matrix, a large worksheet is required unless each method or characteristic is presented separately.

Table 7.13 Comparison Matrix (Example)

Performance Requirement	Method 1 Automated Colorimetry	Method 2 Coulometry
Accuracy		
Baseline drift (% span)	± 5%/day	± 10% of span/day
Span drift	± 2%/day	± 3% of span/day
Interference (% span)	Typically ± 10%	Typically ± 10%
Portability		
Weight	76 lbs.	30 lbs.
Size	15 ft^3	10 ft^3
	Has carrying handles	No handles required

The comparison matrix is converted to the decision matrix of Table 7.14 on a statistical basis. It may often be necessary to rely heavily on engineering judgment.

Table 7.14 Decision Matrix (Example)

Performance Requirement	Method 1	Method 2	Horizontal Sum
1. Accuracy	$P_{11} = 2/3$	$P_{12} = 1/3$	1.0
2. Portability	$P_{21} = 1/4$	$P_{22} = 3/2$	1.0

Since P_{11} is twice as large as P_{12}, this is interpreted to mean that Method 1 has a .66 probability of being first choice, if only accuracy is considered. Since only two choices are assumed to be available.

$$P_{11} + P_{12} = 1.0$$

Table 7.15 is the resultant value matrix determined by the product of the weight factor vector and the decision matrix. Assume that accuracy and portability are equally important in this example.

Table 7.15 Value Matrix (Example)

Performance Requirement	Weight Factor, W_i	Method 1	Method 2
Accuracy	50%	$W_1P_{11} = .333$	$W_1P_{12} = .167$
Portability	50%	$W_2P_{21} = .125$	$W_2P_{22} = .375$
Total Performance Value	100%	$V_1 = .458$	$V_2 = .542$

Since $V_2 > V_1$, Method 2 is the first choice. Here again since only two choices are available, the probability of choosing Method 1 or Method 2 is 100% so that

$$V_1 + V_2 = 1.0$$

A reasonable question to ask is, "How sensitive is the final choice to weight factor variation?" It may be expected to be sensitive to large variations of the weight factors since these factors describe the application and one method is not generally expected the best in all applications. It is not desirable, however, to reach a decision which may be reversed by small changes in the estimate of the importance of one performance requirement. A procedure known as sensitivity analysis adds to the confidence in the decision reached. In this analysis, shifts in relative ranking are observed as each weight factor is varied over a reasonable range. All other weight factors remain the same relative to each other, but normalization is maintained. This is especially simple to do for our sample problem. This result is shown in Tables 7.16 and 7.17. Table 7.17 is the ranking which results from the value analysis of Table 7.16. It shows that Method 2 is the best choice if accuracy is rated at 60% or less and portability is rated at 40% or more.

Table 7.16 Value Matrix Sensitivity for a Range of Weight Factors (Example)

Weight Factor	Method 1	Method 2
Accuracy		
20%	.333	.667
40%	.417	.583
60%	.500	.500
Portability		
20%	.583	.417
40%	.500	.500
60%	.417	.583

Table 7.17 Ranking Sensitivity for a Range of Weight Factors (Example)

	Weight Factor		
	20%	40%	50%
Accuracy			
1st Choice	2	2	1 or 2
2nd Choice	1	1	1 or 2
Portability			
1st Choice	1	1 or 2	2
2nd Choice	2	1 or 2	1

This agrees intuitively with the comparison matrix which shows that Method 2 is best with respect to portability and Method 1 is best with respect to accuracy. Others ways to use sensitivity analysis have been described (Thompson, 1970).

7.4 Performance Summary

The comparison matrix is a summary of the characteristics of each instrument. Rather than a single table in this case, it is the combined tables 7.1 through 7.12.

From these tables, the decision matrix of Table 7.18 was derived for the SO_2 instruments. For lack of a rigorous statistical basis, the relative ranking in each performance category was obtained by assigning 0.35 to the best performer, followed by 0.25, 0.20, 0.15 and 0.05 for the worst performer. Where two or more were about equal, the procedure was altered slightly.

Weight factors are applied in the value matrix of Table 7.19 to pick out the instrument which is best in the most significnat categories. Top importance in this case is given to zero drift, span drift, and maintenance requirements with 14% for each. The FPD instrument is best in the drift categories followed by the GC-FPD and coulometric method. The conductimetric rated best in the maintenance category followed by the coulometric method. Lesser importance (7-9% each) was given to interference (GC-FPD rated best), correlation with other instruments (FPD rated best), operational period as percent of total time in measure mode (FPD rated best), and cost (conductimetric rated best). Relatively little significance was given to the other parameters.

The resulting total value is given on the bottom line showing that the FPD was the best performer when the relative importance of each performance requirement was assigned in the above manner. If only one requirement is important, it is only necessary to look at the relative performance of each instrument for that requirement without going further to the value summation.

The effect of changes in individual weight factors is shown in Table 7.20. This shows that within the constraints of the original weighting, relatively large changes in a single performance requirement have no significant effect on the outcome.

The number of instruments measuring ozone, oxidant, NO_2, and H_2S is too small to carry out a similar evaluation. Relative performance for these instruments is discussed in Sections 1.3 and 7.2.

Table 7.18 DECISION MATRIX

	SO/2 COLO RIME TRIC	SO/2 COND UCTI METR	SO/2 FLAM PHOT DET	SO/? COUL OMET RIC	SO/2 GC FPD
SIZE	.050	.150	.350	.250	.200
POWER	.050	.150	.250	.350	.200
VERSATILITY	.300	.100	.200	.100	.300
INTERFERENCE	.150	.050	.250	.200	.350
SAMPLE FLOW RATE	.150	.050	.200	.250	.350
SET-UP TIME	.250	.100	.250	.350	.050
WARM-UP TIME	.250	.100	.250	.350	.050
0.95 RESPONSE	.050	.200	.350	.200	.200
CORRELATION	.250	.200	.350	.050	.150
ZERO DRIFT	.200	.150	.350	.050	.250
SPAN DRIFT	.200	.050	.350	.250	.150
MIN. DET. CHANGE	.250	.100	.350	.100	.200
DETECTION LIMIT	.150	.350	.250	.050	.200
MAINTENANCE	.050	.350	.150	.250	.200
OPERATNL. PERIOD	.050	.200	.350	.150	.250
COST	.150	.350	.250	.050	.200

Table 7.19 VALUE MATRIX

	WEIGHT	SO/2 COLO RIME TRIC	SO/2 COND UCTI METR	SO/2 FLAM PHOT DET	SO/2 COUL OMET RIC	SO/2 GC FPD
SIZE	.020	.001	.003	.007	.005	.004
POWER	.030	.001	.004	.007	.010	.006
VERSATILITY	.030	.009	.003	.006	.003	.009
INTERFERENCE	.090	.013	.004	.022	.018	.031
SAMPLE FLOW RATE	.030	.004	.001	.006	.007	.010
SET-UP TIME	.020	.005	.002	.005	.007	.001
WARM-UP TIME	.020	.005	.002	.005	.007	.001
0.95 RESPONSE	.030	.001	.006	.010	.006	.006
CORRELATION	.090	.022	.018	.031	.004	.013
ZERO DRIFT	.140	.028	.021	.049	.007	.035
SPAN DRIFT	.140	.028	.007	.049	.035	.021
MIN. DET. CHANGE	.040	.010	.004	.014	.004	.008
DETECTION LIMIT	.040	.006	.014	.010	.002	.008
MAINTENANCE	.140	.007	.049	.021	.035	.028
OPERATNL. PERIOD	.070	.003	.014	.024	.010	.017
COST	.070	.010	.024	.017	.003	.014
VALUE		.156	.178	.286	.165	.214

Table 7.20 SENSITIVITY OF THE VALUE MATRIX TO A CHANGE IN WEIGHT FACTORS

		SO/2 COLORIMETRIC	SO/2 CONDUCTIMETR	SO/2 FLAM PHOT DET	SO/2 COULOMETRIC	SO/2 GC FPD
SIZE	(.020)					
	.000	.159	.179	.285	.164	.214
	.050	.153	.177	288	.168	.214
	.150	.142	.174	294	.177	.212
	.250	.132	.171	.301	.185	.211
POWER	(.030)					
	.000	.160	.179	.287	.160	.214
VERSATILITY	(.030)					
	.000	.152	.180	.289	.168	.211
INTERFERENCE	(.090)					
	.000	.157	.191	.290	.162	.201
	.100	.156	.177	.286	.166	.215
SAMPLE FLOW RATE	(.030)					
	.000	.157	.182	.289	.163	.210
SET-UP TIME	(.020)					
	.000	.155	.180	287	.162	.217
WARM-UP TIME	(.020)					
	.000	.155	.180	.287	.162	.217
0.95 RESPONSE	(.030)					
	.000	.160	.177	.284	.164	.214
	.050	.154	.178	.287	.166	.214
	.100	.149	.180	.291	.168	.213
CORRELATION	(.090)					
	.000	.147	.176	.280	.177	.220
	.050	.152	.177	.283	.171	.217
	.100	.158	.178	.287	.164	.213
	.150	.163	.179	.290	.158	.210
ZERO DRIFT	(.140)					
	.000	.149	.183	.276	.184	.208
	.100	.154	.179	.283	.171	.212
	.250	.162	.174	.294	.151	.219
SPAN DRIFT	(.140)					
	.000	.149	.199	.276	.152	.224
	.100	.154	.184	.283	.162	.217
	.250	.162	.162	.294	.176	.206
MIN. DET. CHANGE	(.040)					
	.000	.153	.181	.283	.168	.215
DETECTION LIMIT	(.040)					
	.000	.157	.171	287	.170	.215
MAINTENANCE	(.140)					
	.000	.174	.150	.308	.152	.216
	.100	.161	.170	.292	.162	.215
	.250	.143	.200	.269	.176	.212
OPERATNL. PERIOD	(.070)					
	.000	.165	.176	.281	.167	.211
COST	(.070)					
	.000	.157	.165	.289	.174	.215

8.0 AIR POLLUTION SUMMARY

The ambient air monitoring that was performed at the Los Angeles site in the course of evaluating each instrument's performance indicated several characteristics of this environment. The frequency distribution of average pollutant concentration measured by each O_3, O_x, SO_2 and NO_2 instrument is given as a percentage of total measurements in Tables 8.1 through 8.5. The averages are hourly, 3-hour, 6-hour, 12-hour, and 24-hour, respectively. Graphical characteristics of oxidant, ozone, and sulfur dioxide are presented in the following sections. In addition, the monthly diurnal averages obtained from each instrument are given in Appendix D.

8.1 Ozone

The ozone concentration was relatively high during the daylight hours averaging 0.033 ppm from 0600 hours to 1800 with maximum hourly averages occurring between 1200 and 1500 hours usually above 0.1 ppm. Occasionally nighttime ozone was observed and its presence correlated well with unusually low NO_2 levels. The monthly diurnal ozone averages as measured by the solid phase and gas phase chemiluminescent methods are shown in Figures 8.1 through 8.6. The two instruments show identical behavior. The daily peaks become narrower and smaller each successive month as the solar radiation decreases. The data has been adjusted (corrected indication on graph) for continuous drift between each successive calibration.

8.2 Oxidant

The primary oxidant is ozone. Ozone concentrations are actually higher than the indicated oxidant values on many occasions where there is SO_2 interference. The oxidant monthly diurnal averages

Figure 8.1

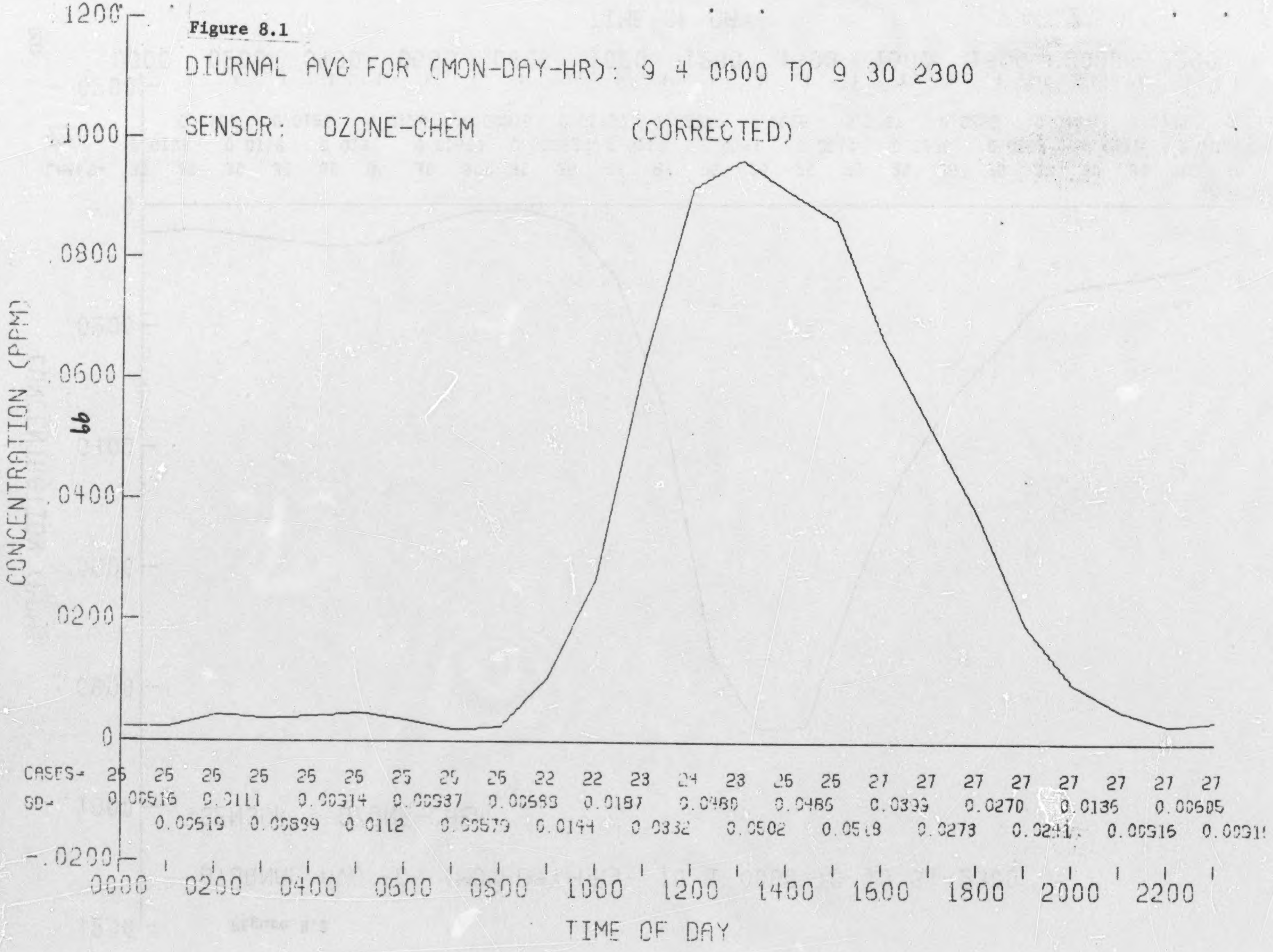

DIURNAL AVG FOR (MON-DAY-HR): 9 4 0600 TO 9 30 2300
SENSOR: OZONE-CHEM (CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES- 25 25 25 25 25 25 25 25 25 22 22 23 24 23 25 25 27 27 27 27 27 27 27 27
SD- 0.00516 0.0111 0.00314 0.00937 0.00593 0.0187 0.0480 0.0486 0.0399 0.0270 0.0136 0.00605
0.00519 0.00899 0.0112 0.00579 0.0144 0.0332 0.0502 0.0518 0.0273 0.0241 0.00916 0.0091
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY

Figure 8.2

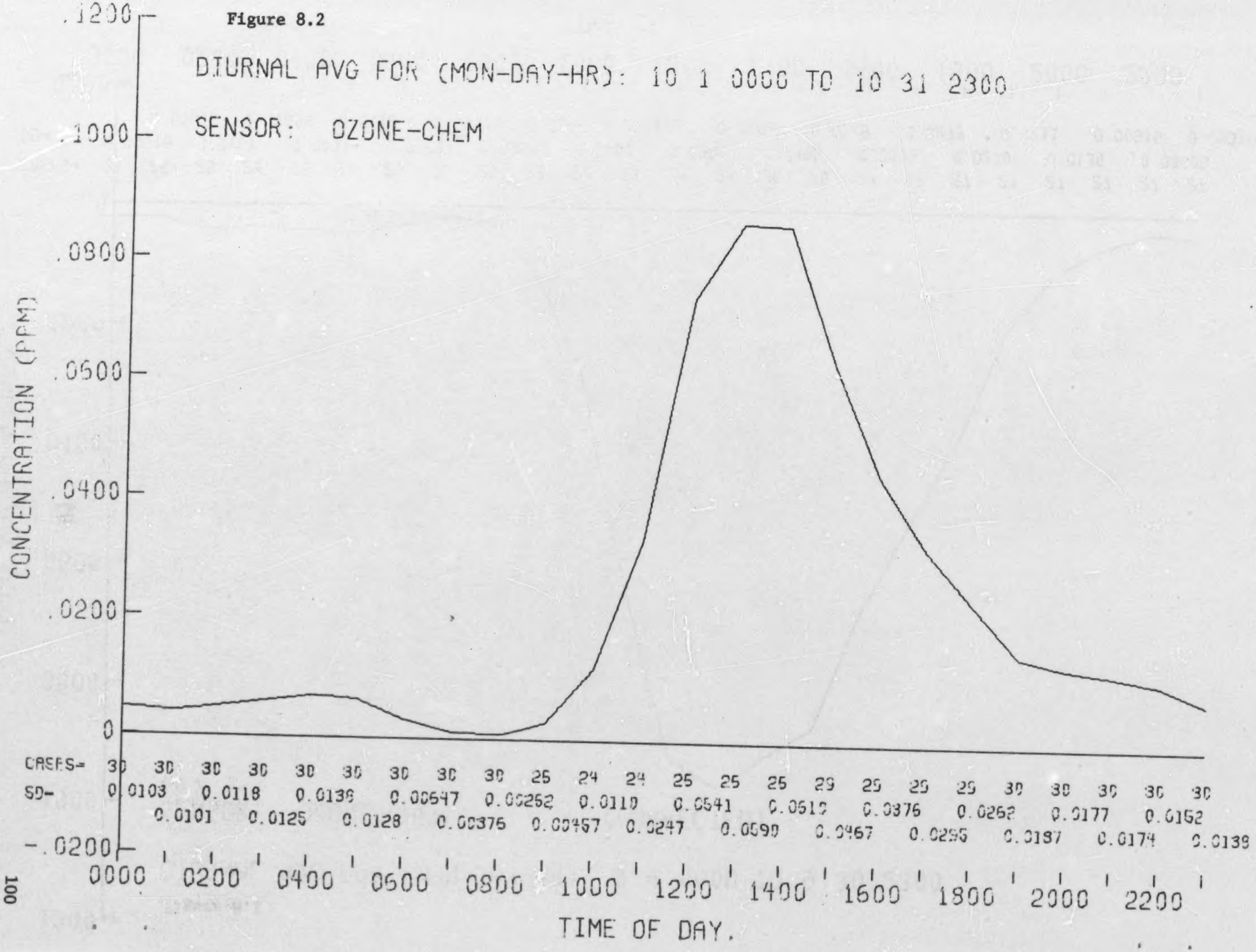

DIURNAL AVG FOR (MON-DAY-HR): 10 1 0000 TO 10 31 2300
SENSOR: OZONE-CHEM
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES=
30 30 30 30 30 30 30 30 30 25 24 24 25 25 25 29 25 25 29 30 30 30 30 30
SD-
0.0103 0.0101 0.0118 0.0125 0.0139 0.0128 0.00647 0.00376 0.00262 0.00457 0.0110 0.0247 0.0541 0.0599 0.0519 0.0467 0.0376 0.0295 0.0262 0.0187 0.0177 0.0174 0.0152 0.0139
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY.

Figure 8.3

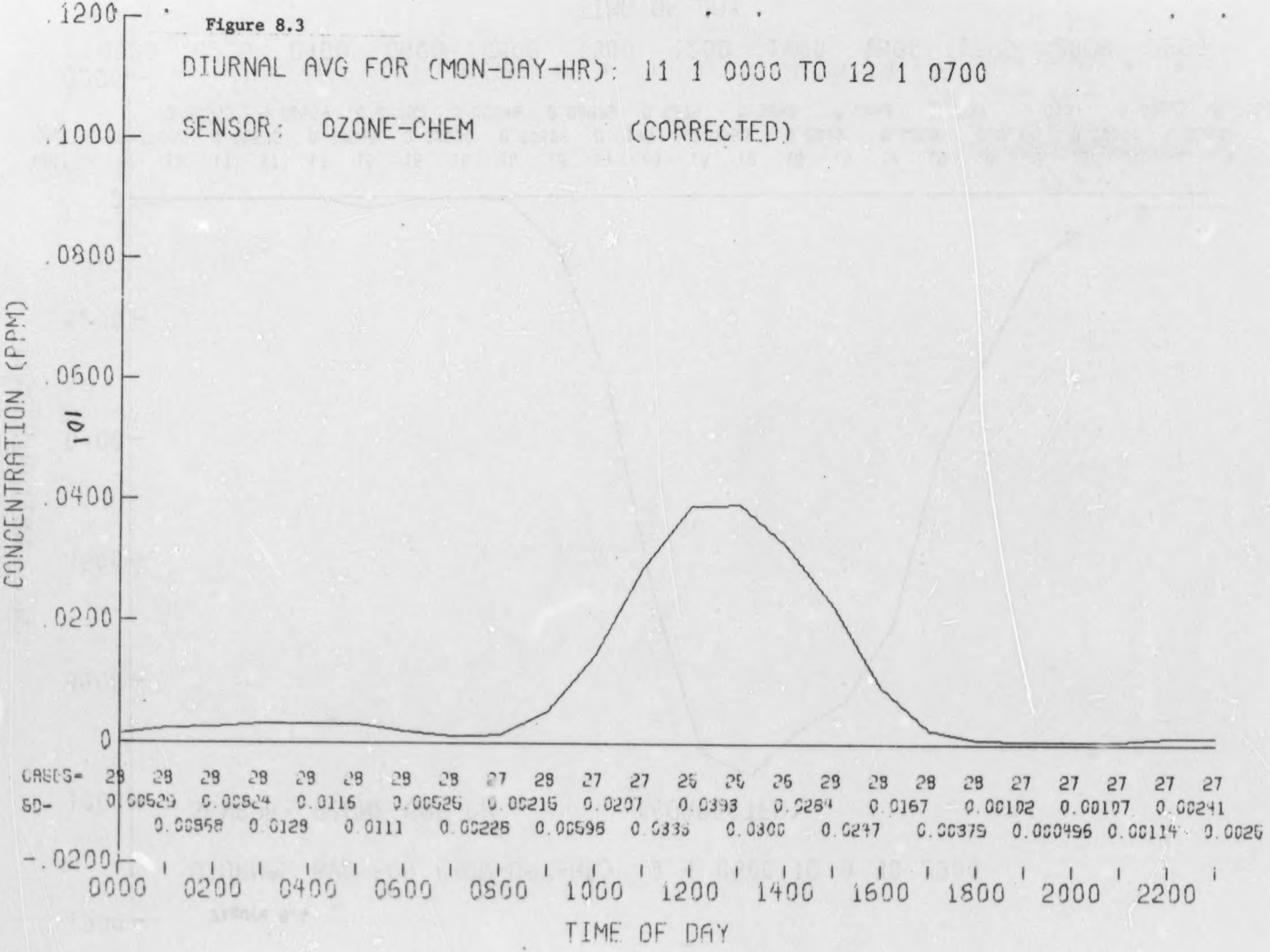

DIURNAL AVG FOR (MON-DAY-HR): 11 1 0000 TO 12 1 0700
SENSOR: OZONE-CHEM (CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 28 28 28 28 28 28 28 28 27 28 27 27 25 25 26 28 28 28 28 27 27 27 27 27
SD- 0.00529 0.00958 0.00524 0.0129 0.0116 0.0111 0.00525 0.00226 0.00215 0.00596 0.0207 0.0335 0.0393 0.0300 0.0264 0.0247 0.0167 0.00379 0.00102 0.000496 0.00107 0.00114 0.00241 0.0025
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY

Figure 8.4

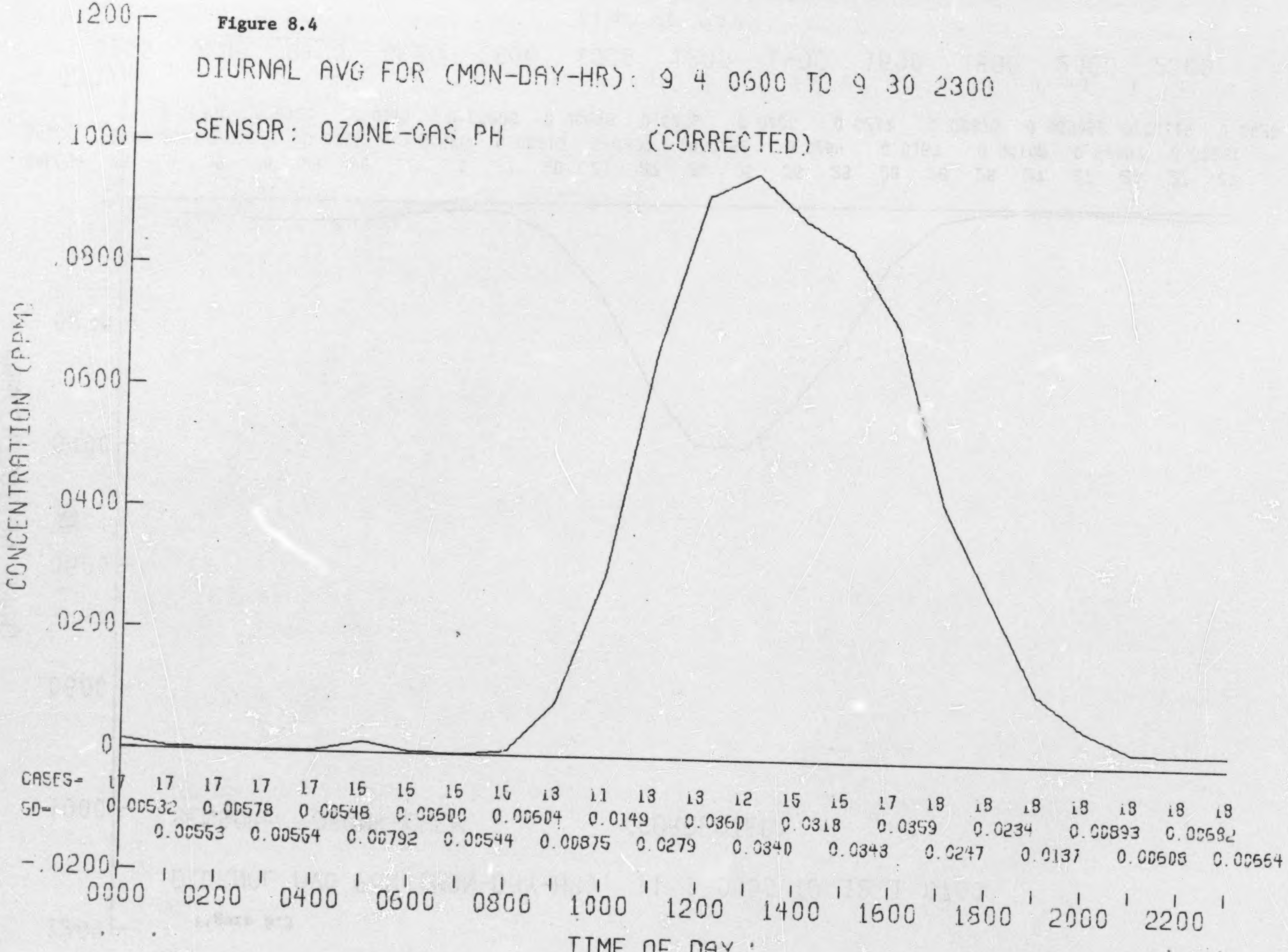

DIURNAL AVG FOR (MON-DAY-HR): 9 4 0600 TO 9 30 2300
SENSOR: OZONE-GAS PH
(CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 17 17 17 17 17 15 15 15 10 13 11 13 13 12 15 15 17 18 18 18 18 18 18 18
SD= 0.00532 0.00553 0.00578 0.00554 0.00548 0.00792 0.00500 0.00544 0.00504 0.00875 0.0149 0.0279 0.0360 0.0340 0.0318 0.0343 0.0359 0.0247 0.0234 0.0137 0.00893 0.00505 0.00582 0.00554
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY

Figure 8.5

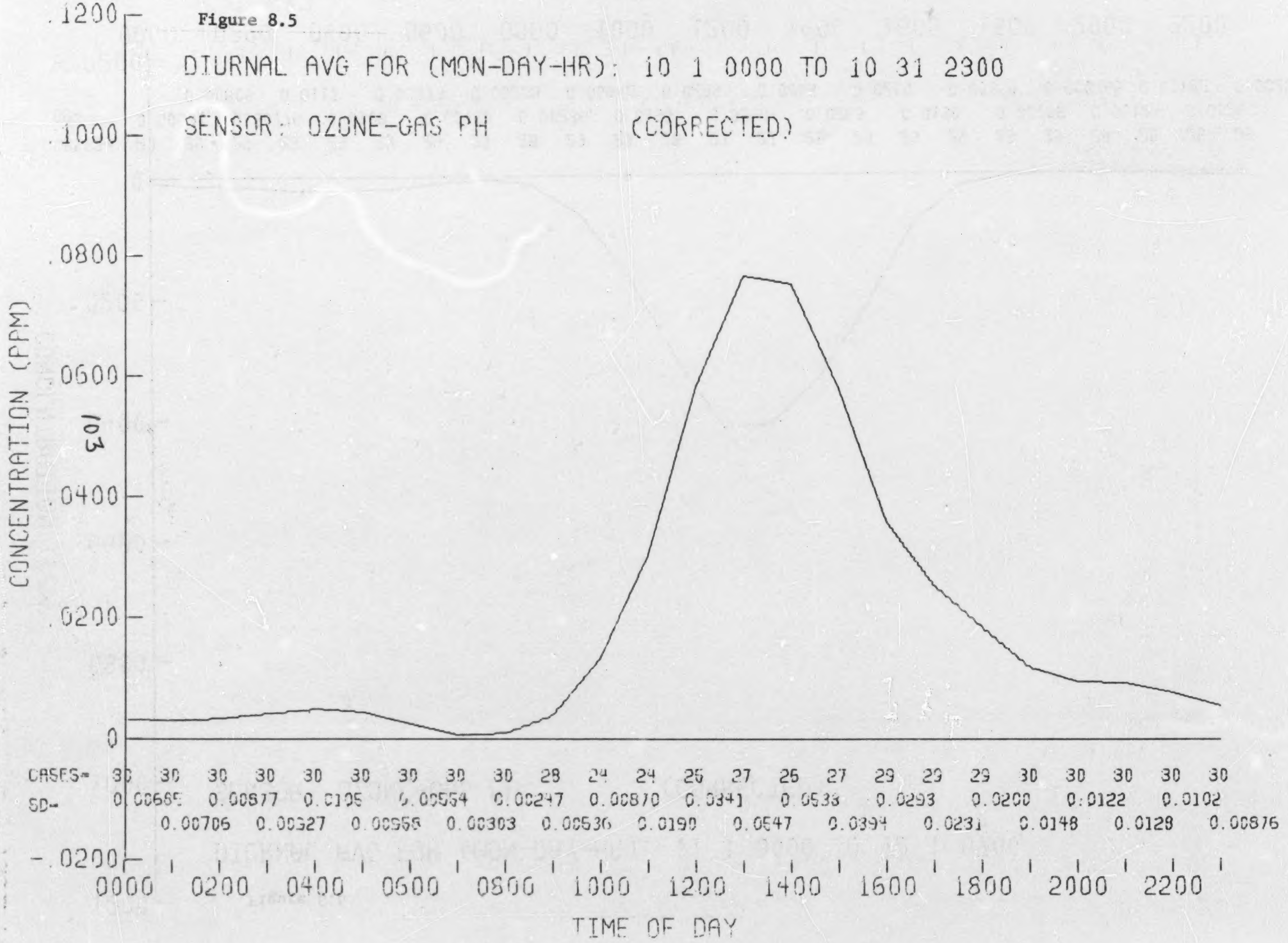
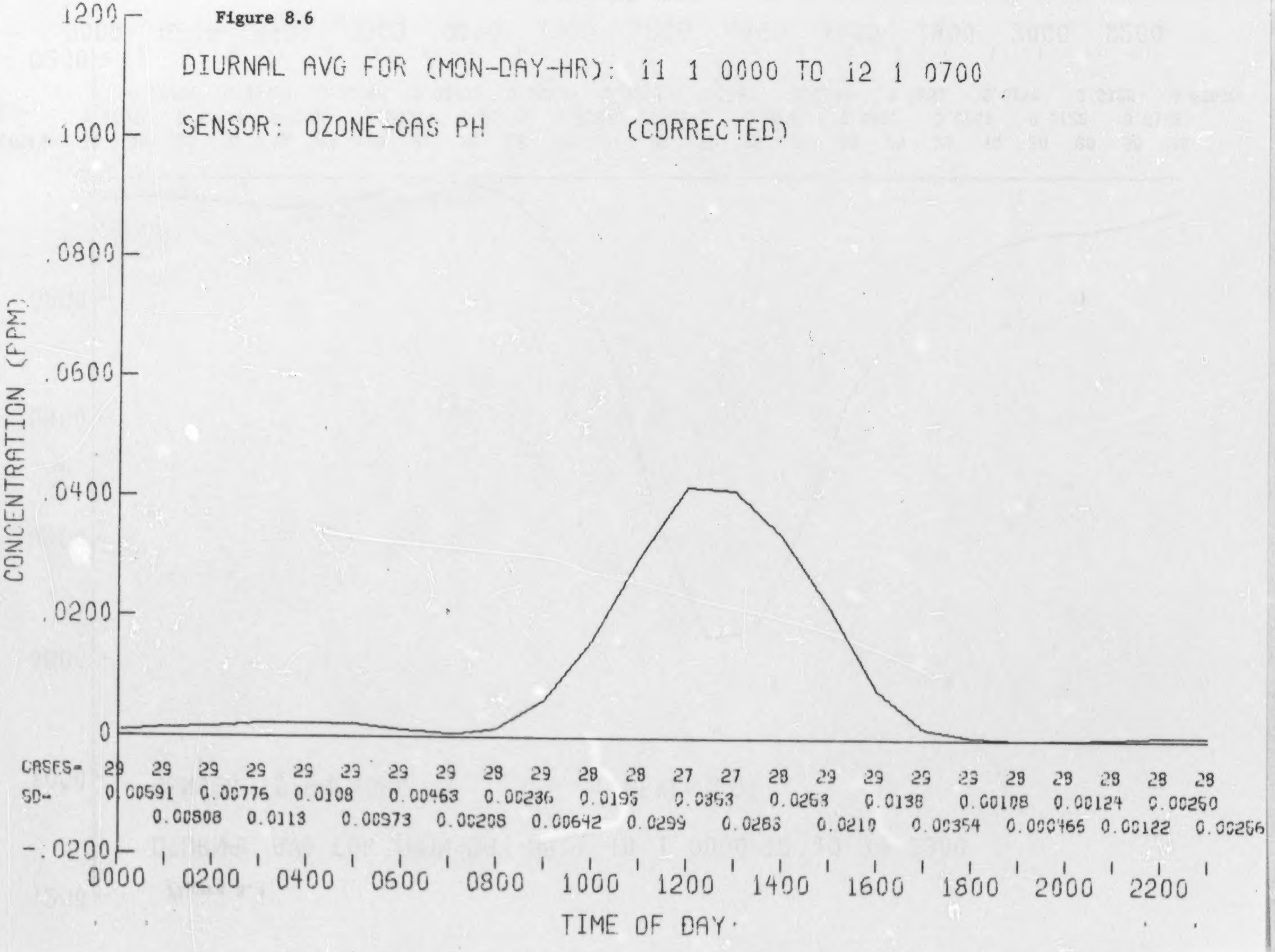

DIURNAL AVG FOR (MON-DAY-HR): 10 1 0000 TO 10 31 2300
SENSOR: OZONE-GAS PH (CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 30 30 30 30 30 30 30 30 30 28 24 24 25 27 25 27 29 29 29 30 30 30 30 30
SD- 0.00665 0.00706 0.00877 0.00327 0.0105 0.00958 0.00554 0.00303 0.00247 0.00536 0.00870 0.0190 0.0341 0.0547 0.0538 0.0394 0.0293 0.0231 0.0200 0.0148 0.0122 0.0128 0.0102 0.00876
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY

Figure 8.6


DIURNAL AVG FOR (MON-DAY-HR): 11 1 0000 TO 12 1 0700
SENSOR: OZONE-GAS PH (CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES- 29 29 29 29 29 23 29 29 28 29 28 28 27 27 28 29 29 29 23 28 28 28 28 28
SD- 0.00591 0.00776 0.0108 0.00463 0.00236 0.0195 0.0353 0.0253 0.0138 0.00108 0.00124 0.00250
0.00808 0.0113 0.00973 0.00208 0.00642 0.0299 0.0263 0.0210 0.00354 0.000465 0.00122 0.00256
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY

are shown in Figures 8.7 through 8.9. These results are the combined averages of the coulometric and colorimetric instruments.

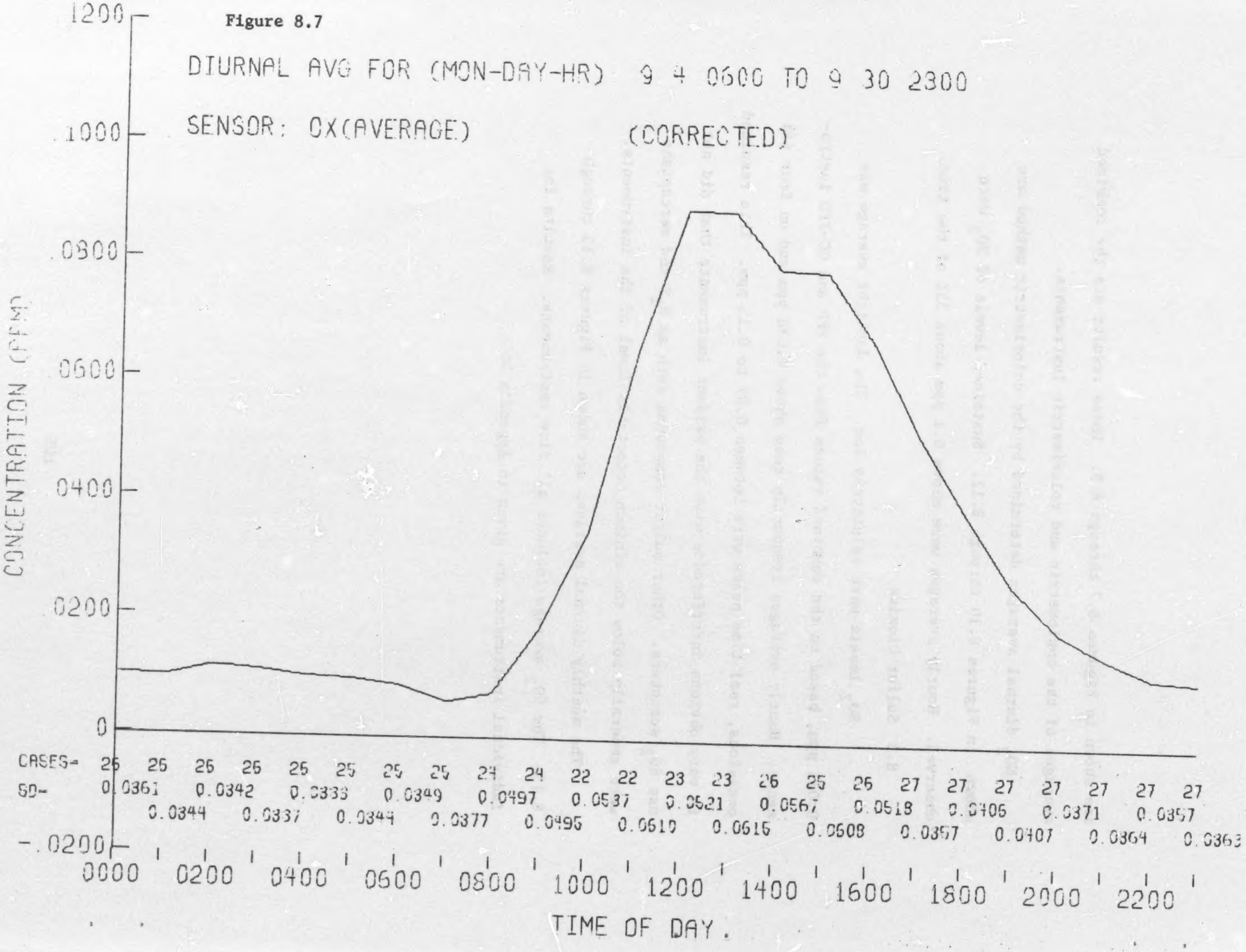
NO_2 diurnal averages determined by the colorimetric method are shown in Figures 8.10 through 8.12. Sustained levels of NO_2 were observed. Hourly averages were above 0.1 ppm about 33% of the time.

8.3 Sulfur Dioxide

SO_2 levels were relatively low. The daylight average was 0.011 ppm, based on the combined values from the FPD and GC-FPD instruments. Hourly averages frequently rose above 0.030 ppm and on four (4) occasions, real time peaks were between 0.01 to 0.15 ppm. This resulted in very obvious interference with the oxidant instruments that did not use SO_2 scrubbers. Other sulfur compounds such as H_2S and mercaptans were generally below the minimum detectable level of the instruments.

The monthly diurnal averages are shown in Figures 8.13 through 8.15. The SO_2 average includes all five instruments. Results for individual instruments are given in Appendix D.

Figure 8.7


DIURNAL AVG FOR (MON-DAY-HR) 9 4 0600 TO 9 30 2300
SENSOR: OX(AVERAGE)
(CORRECTED)
CONCENTRATION (PPM)
1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES-
25 25 26 26 25 25 25 25 24 24 22 22 23 23 26 25 26 27 27 27 27 27 27 27
SD-
0.0361 0.0344 0.0342 0.0337 0.0333 0.0344 0.0349 0.0377 0.0497 0.0495 0.0537 0.0619 0.0521 0.0615 0.0567 0.0608 0.0518 0.0357 0.0406 0.0407 0.0371 0.0364 0.0357 0.0363
0000 0200 0400 0600 0800 1000 1200 1400 1600 1800 2000 2200
TIME OF DAY.

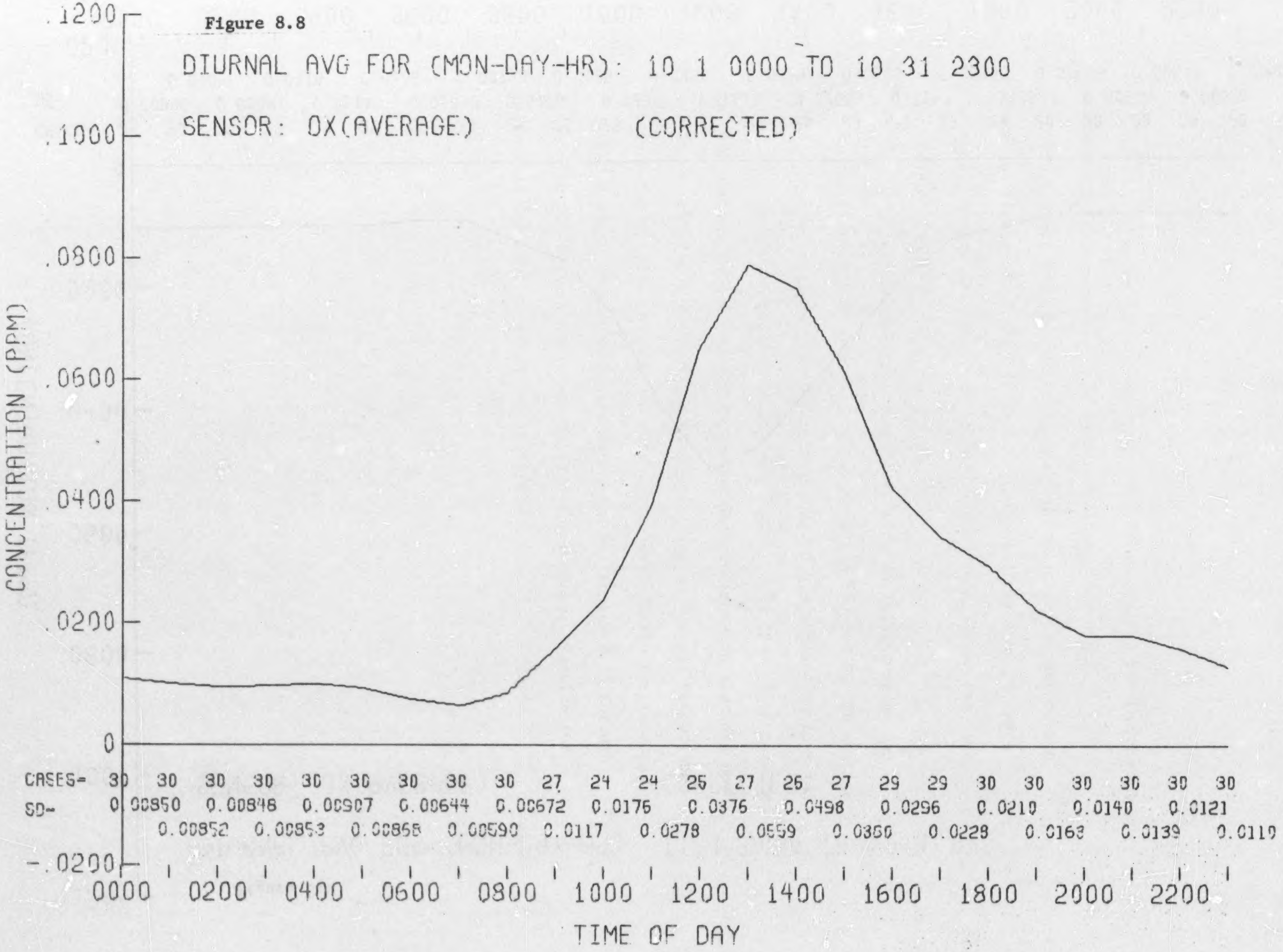


Figure 8.8

DIURNAL AVG FOR (MON-DAY-HR): 10 1 0000 TO 10 31 2300

SENSOR: OX(AVERAGE) (CORRECTED)

Figure 8.9

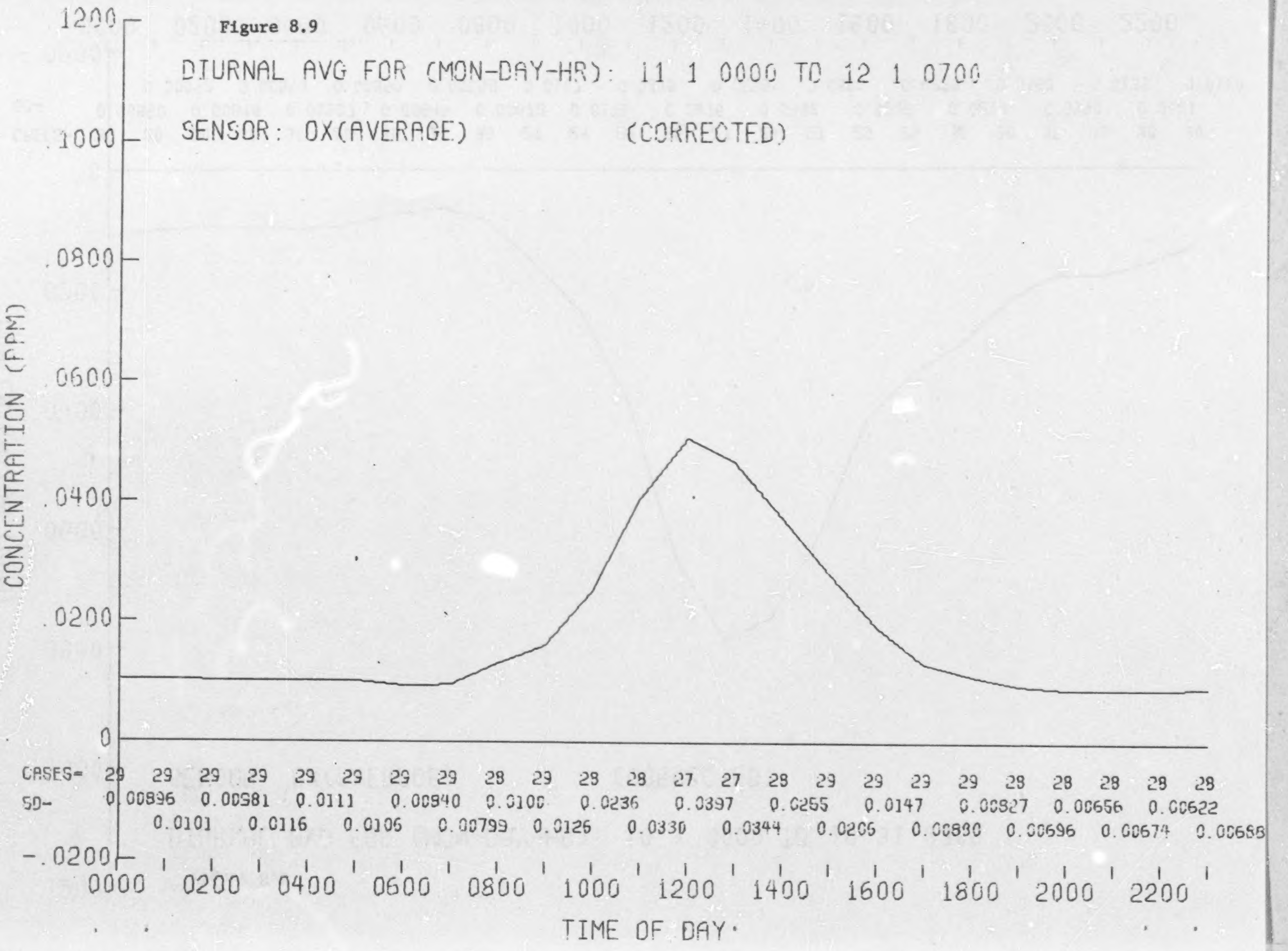

DIURNAL AVG FOR (MON-DAY-HR): 11 1 0000 TO 12 1 0700
SENSOR: OX(AVERAGE)
(CORRECTED)
CONCENTRATION (PPM)
1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 29 29 29 29 29 29 29 29 28 29 28 28 27 27 28 29 29 29 29 28 28 28 28 28
SD- 0.00896 0.0101 0.00981 0.0116 0.0111 0.0106 0.00940 0.00799 0.0100 0.0126 0.0236 0.0330 0.0397 0.0344 0.0255 0.0205 0.0147 0.00880 0.00827 0.00696 0.00656 0.00674 0.00622 0.00688
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY

Figure 8.10

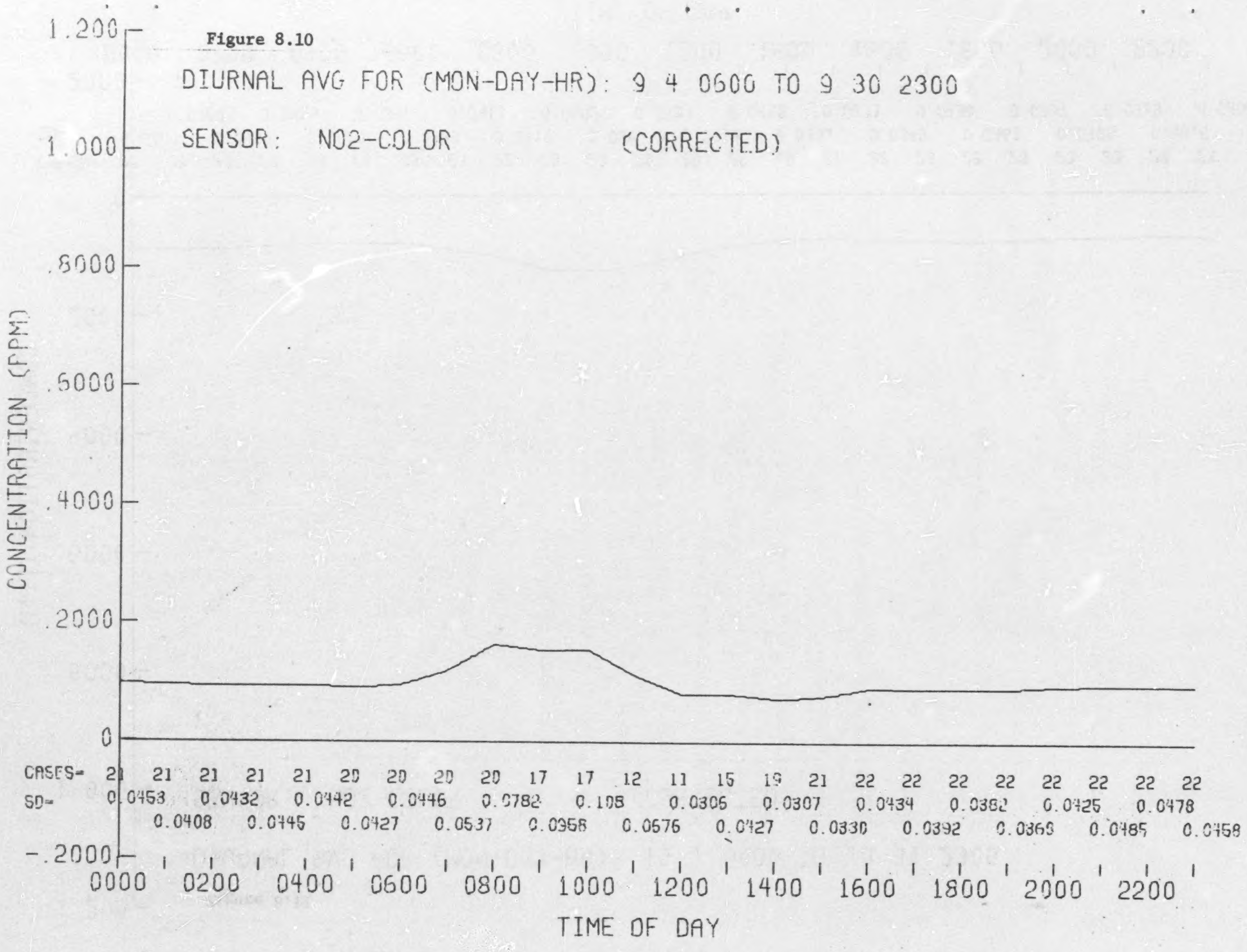

DIURNAL AVG FOR (MON-DAY-HR): 9 4 0600 TO 9 30 2300
SENSOR: NO2-COLOR (CORRECTED)
CONCENTRATION (PPM)
1.200
1.000
.8000
.6000
.4000
.2000
0
-.2000
CASES= 21 21 21 21 21 20 20 20 20 17 17 12 11 15 19 21 22 22 22 22 22 22 22 22
SD= 0.0453 0.0432 0.0442 0.0446 0.0782 0.108 0.0306 0.0307 0.0434 0.0382 0.0425 0.0478
0.0408 0.0445 0.0427 0.0537 0.0958 0.0676 0.0427 0.0330 0.0392 0.0369 0.0485 0.0458
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY

Figure 8.11

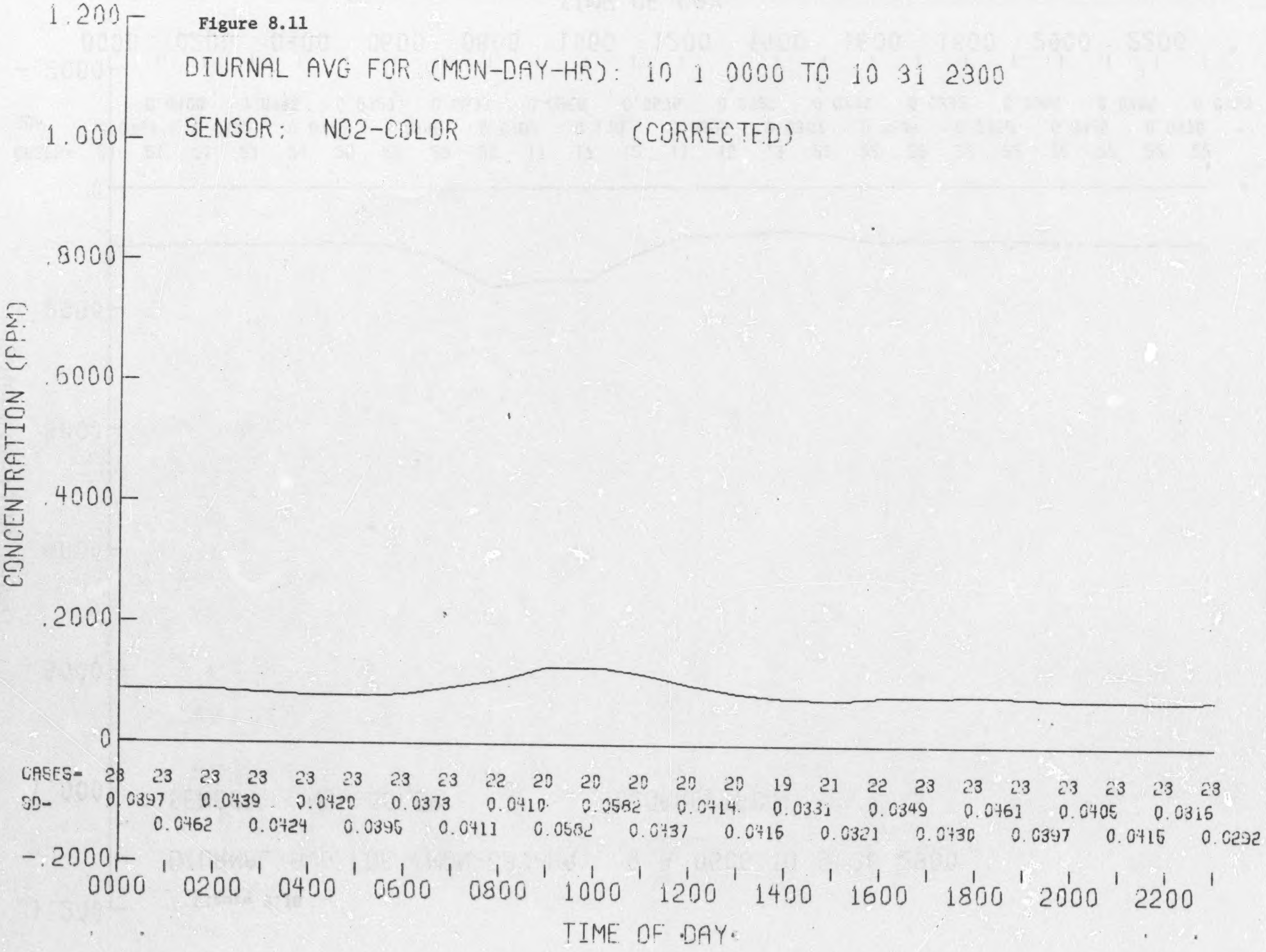

DIURNAL AVG FOR (MON-DAY-HR): 10 1 0000 TO 10 31 2300
SENSOR: NO2-COLOR (CORRECTED)
CONCENTRATION (PPM)
1.200
1.000
.8000
.6000
.4000
.2000
0
-.2000
CASES- 23 23 23 23 23 23 23 23 22 20 20 20 20 20 19 21 22 23 23 23 23 23 23 23
SD- 0.0397 0.0462 0.0439 0.0424 0.0420 0.0395 0.0373 0.0411 0.0410 0.0582 0.0582 0.0437 0.0414 0.0416 0.0331 0.0321 0.0349 0.0430 0.0461 0.0397 0.0405 0.0415 0.0316 0.0292
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY

Figure 8.12

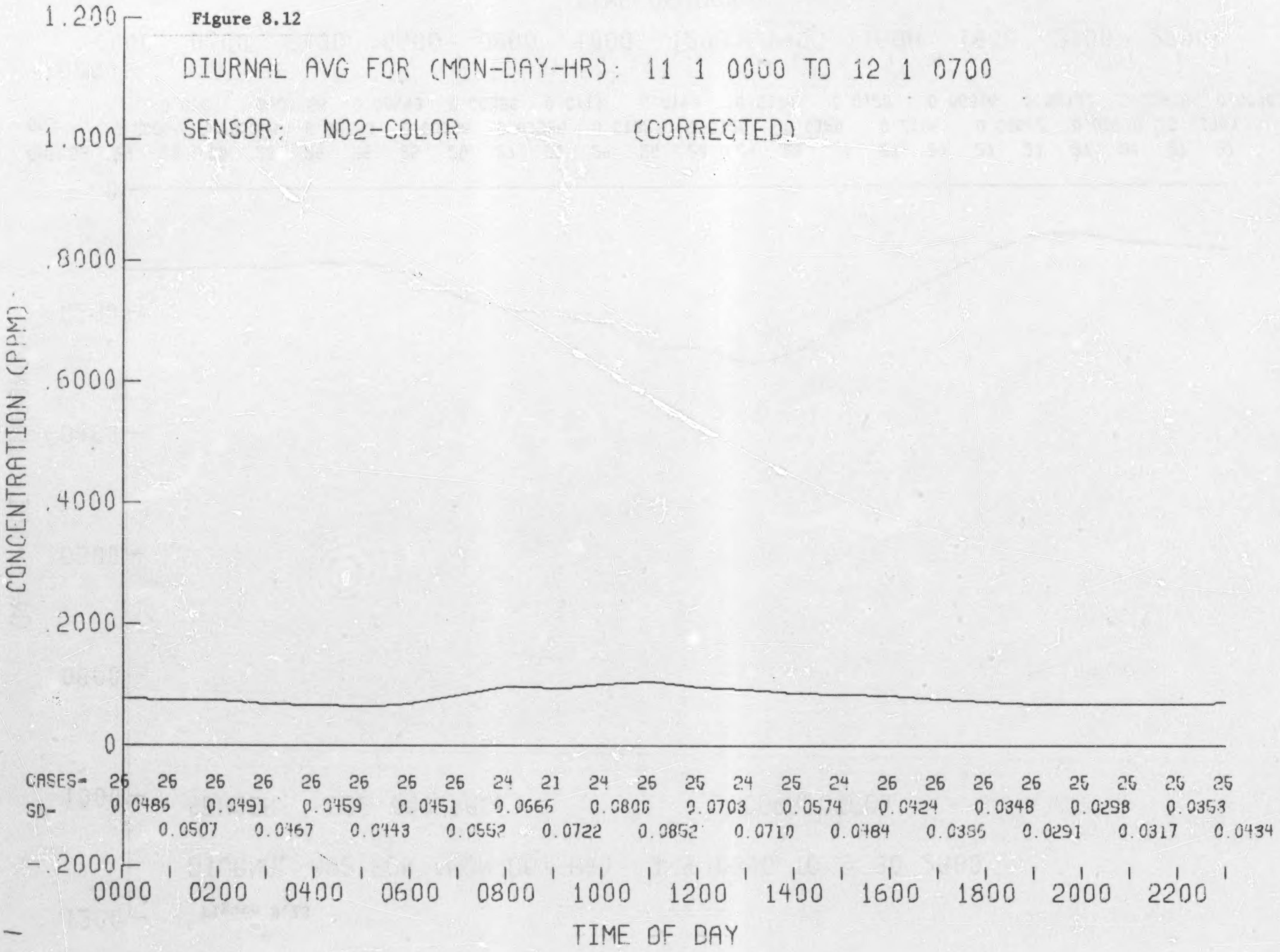

DIURNAL AVG FOR (MON-DAY-HR): 11 1 0000 TO 12 1 0700
SENSOR: NO2-COLOR (CORRECTED)
CONCENTRATION (PPM)
1.200
1.000
.8000
.6000
.4000
.2000
0
-.2000
CASES- 26 26 26 26 26 26 26 26 24 21 24 26 25 24 25 24 26 26 26 26 25 25 25 25
SD- 0.0486 0.0507 0.0491 0.0467 0.0459 0.0443 0.0451 0.0552 0.0666 0.0722 0.0800 0.0852 0.0703 0.0710 0.0574 0.0484 0.0424 0.0386 0.0348 0.0291 0.0298 0.0317 0.0353 0.0434
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY

Figure 8.13

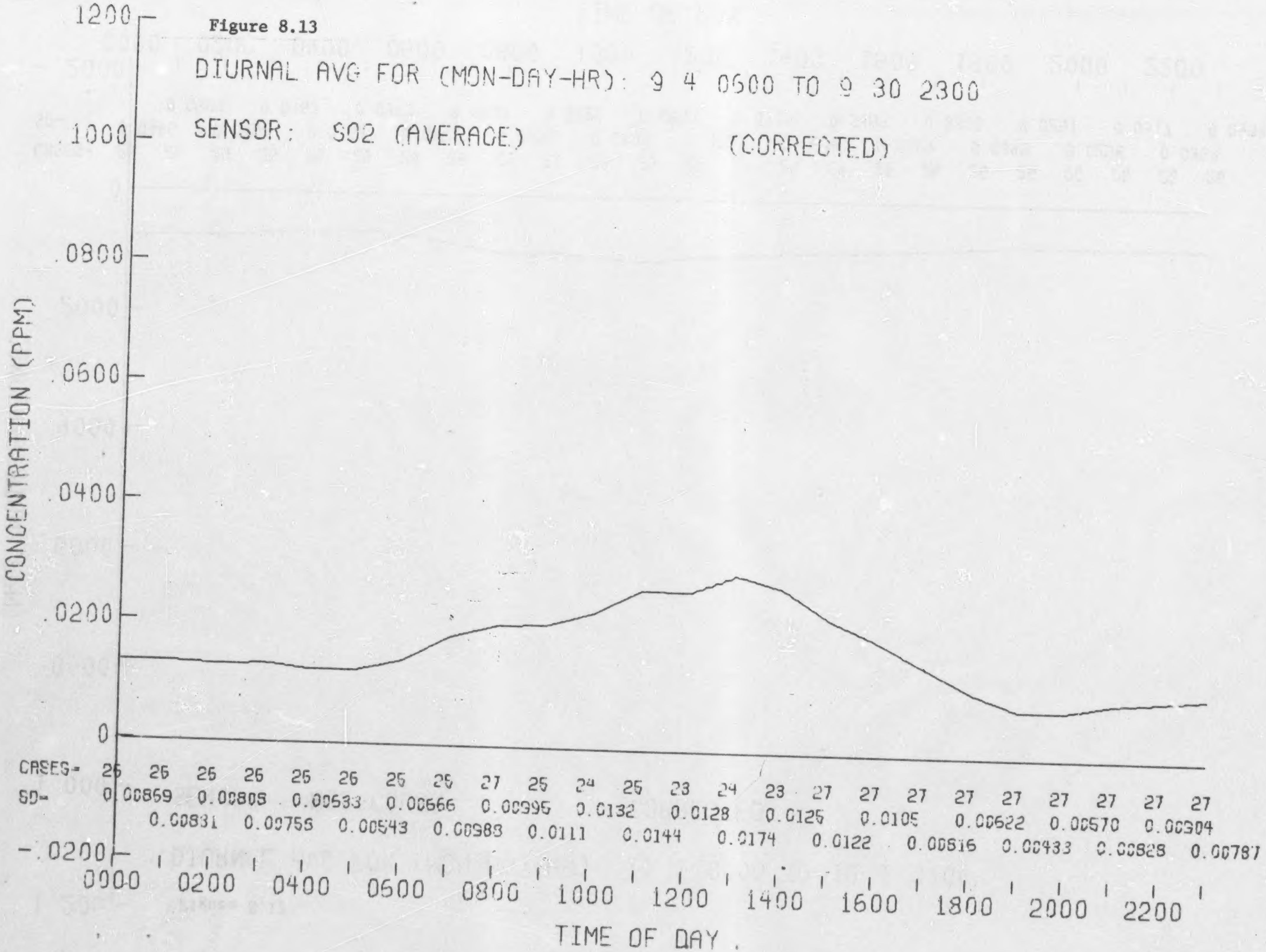

DIURNAL AVG FOR (MON-DAY-HR): 9 4 0600 TO 9 30 2300
SENSOR: SO2 (AVERAGE)
(CORRECTED)
CONCENTRATION (PPM)
1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES- 25 26 25 26 25 26 25 25 27 25 24 25 23 24 23 27 27 27 27 27 27 27 27 27
SD- 0.00869 0.00831 0.00805 0.00755 0.00533 0.00543 0.00666 0.00983 0.00995 0.0111 0.0132 0.0144 0.0128 0.0174 0.0125 0.0122 0.0105 0.00616 0.00622 0.00433 0.00570 0.00828 0.00304 0.00787
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY .

Figure 8.14

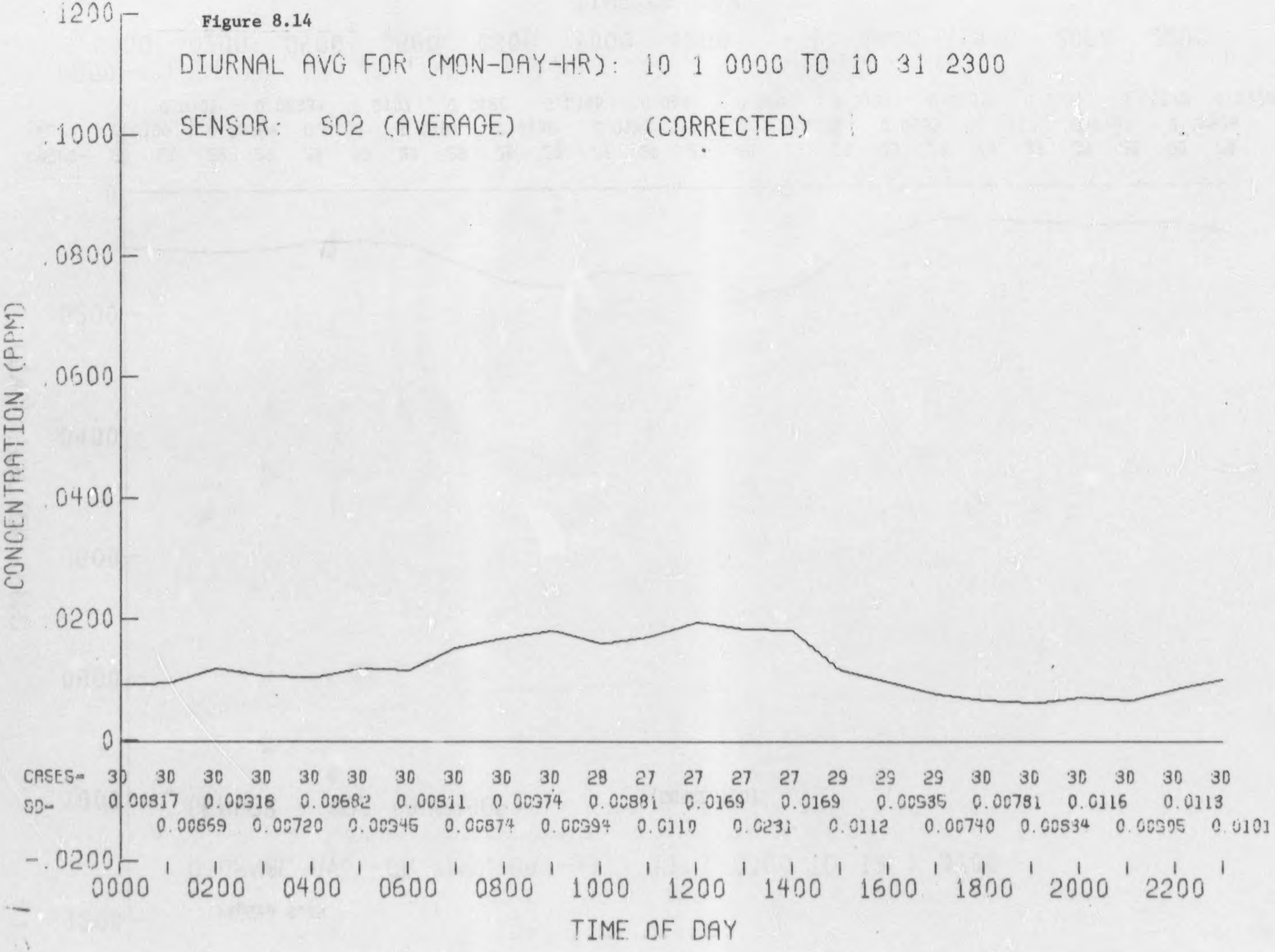

DIURNAL AVG FOR (MON-DAY-HR): 10 1 0000 TO 10 31 2300
SENSOR: SO2 (AVERAGE) (CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES- 30 30 30 30 30 30 30 30 30 30 28 27 27 27 27 29 29 29 30 30 30 30 30 30
SD- 0.00817 0.00318 0.00682 0.00811 0.00374 0.00881 0.0169 0.0169 0.00535 0.00781 0.0116 0.0113
0.00659 0.00720 0.00345 0.00874 0.00394 0.0110 0.0231 0.0112 0.00740 0.00534 0.00505 0.0101
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY

Figure 8.15

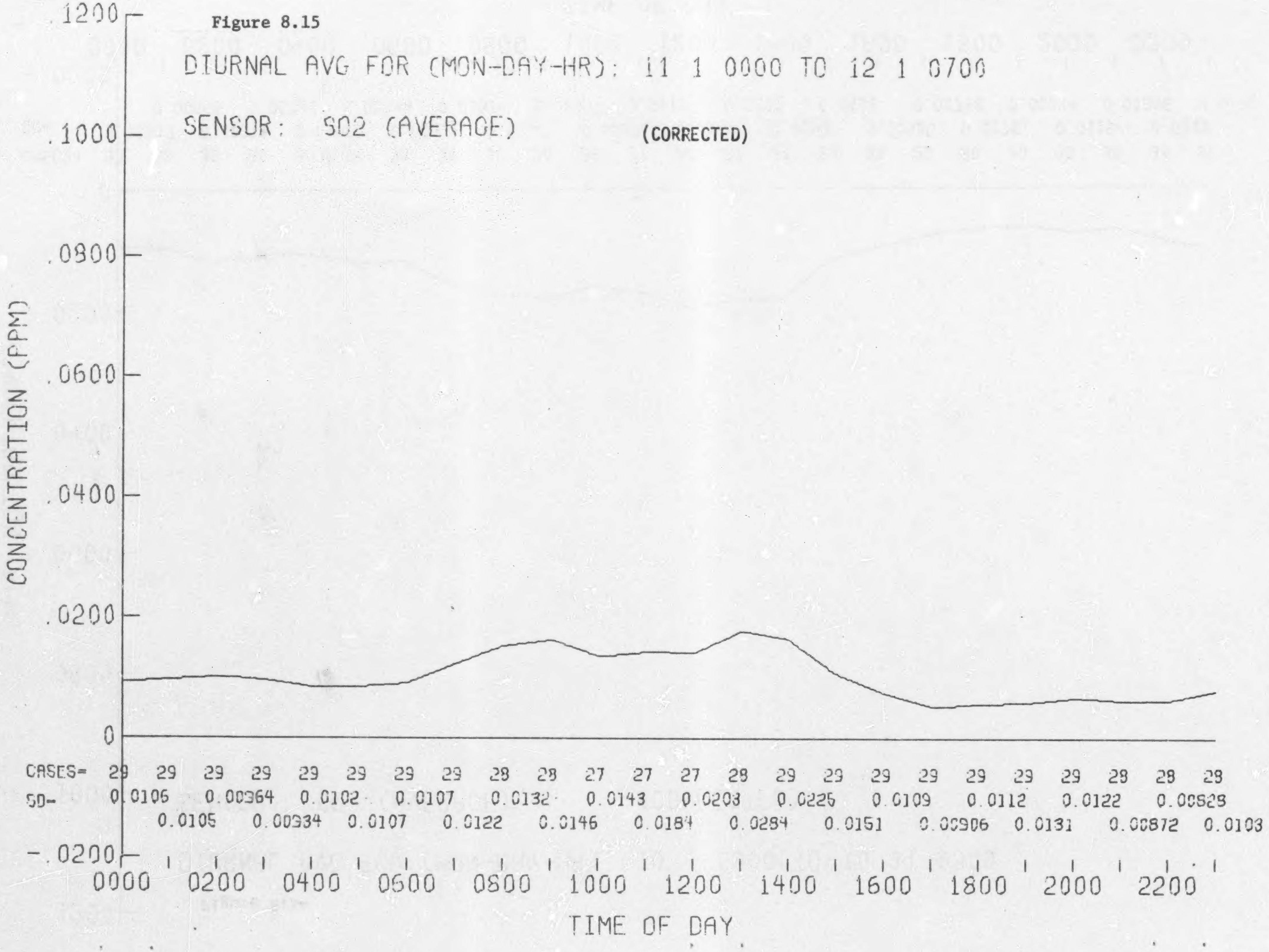

DIURNAL AVG FOR (MON-DAY-HR): 11 1 0000 TO 12 1 0700
SENSOR: SO2 (AVERAGE)
(CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 29 29 29 29 29 29 29 29 28 28 27 27 27 28 29 29 29 29 29 29 29 28 28 28
SD- 0.0106 0.00364 0.0102 0.0107 0.0132 0.0143 0.0203 0.0225 0.0109 0.0112 0.0122 0.00828
0.0105 0.00334 0.0107 0.0122 0.0146 0.0184 0.0284 0.0151 0.00906 0.0131 0.00872 0.0103
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY

TABLE 8.1 **FREQUENCY DISTRIBUTION** (Corrected Hourly Average) 9/ 4/70 TO 12/ 1/70

PERCENT ABOVE	OZONE CHEM	OZONE GAS PH	OXIDANT COUL	OXIDANT COLOR	SO2 COLOR	SO2 FPD	SO2 BOUL	SO2 COND	SO2 GC-FPD	NO2 COLOR
-.0050	100.00 %	97.44 %	100.00 %	97.19 %	95.02 %	90.82 %	89.85 %	100.00 %	98.31 %	100.00 %
-.0020	99.64 %	96.52 %	100.00 %	96.22 %	86.48 %	84.72 %	85.35 %	99.08 %	96.73 %	100.00 %
0.0000	66.29 %	70.48 %	99.27 %	91.64 %	71.28 %	79.81 %	82.07 %	83.39 %	95.15 %	99.88 %
.0025	47.70 %	48.95 %	72.22 %	88.22 %	52.71 %	71.67 %	76.60 %	71.21 %	89.19 %	99.75 %
.0050	43.21 %	42.45 %	52.80 %	82.98 %	50.25 %	60.93 %	70.26 %	64.83 %	72.38 %	99.69 %
.0100	37.54 %	33.73 %	38.79 %	76.33 %	35.60 %	41.78 %	57.11 %	53.57 %	44.39 %	99.32 %
.0150	32.58 %	28.38 %	31.46 %	66.44 %	25.44 %	17.94 %	42.40 %	44.43 %	23.19 %	98.76 %
.0200	28.65 %	24.73 %	25.65 %	57.17 %	12.03 %	9.02 %	31.35 %	36.26 %	13.39 %	97.32 %
.0300	21.81 %	18.01 %	18.12 %	41.06 %	8.69 %	2.35 %	17.87 %	21.86 %	5.79 %	92.59 %
.0400	16.55 %	13.62 %	13.29 %	30.63 %	4.63 %	.78 %	8.91 %	13.47 %	2.74 %	86.93 %
.0500	13.13 %	10.94 %	10.23 %	23.25 %	1.75 %	.52 %	4.46 %	8.01 %	1.58 %	79.03 %
.0750	7.81 %	5.64 %	5.04 %	13.79 %	.21 %	.10 %	.54 %	3.4[illegible] %	.37 %	52.96 %
.1000	4.70 %	3.36 %	2.39 %	9.70 %	.07 %	.10 %	.16 %	.97 %	.05 %	33.17 %
.1250	2.50 %	1.65 %	1.09 %	5.06 %	.07 %	0.00 %	.11 %	.16 %	0.00 %	17.73 %
.1500	1.63 %	.46 %	.47 %	2.81 %	0.00 %	0.00 %	.05 %	.05 %	0.00 %	11.70 %
.2000	.31 %	.11 %	.10 %	.73 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	4.11 %
.3000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	.44 %
.4000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
.6000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
.8000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %

TABLE 8.2 FREQUENCY DISTRIBUTION OF 3-HOUR AVERAGES 9/ 4/70 TO 12/ 1/70

PERCENT ABOVE	OZONE CHEM	OZONE GAS PH	OXIDANT COUL	OXIDANT COLOR	SO2 COLOR	SO2 FPD	SO2 COUL	SO2 COND	SO2 GC-FPD	NO2 COLOR
-.0050	100.00 %	97.78 %	100.00 %	97.26 %	95.82 %	91.11 %	91.03 %	100.00 %	98.59 %	100.00 %
-.0020	99.69 %	96.93 %	100.00 %	96.53 %	87.03 %	85.80 %	85.10 %	99.35 %	97.49 %	100.00 %
0.0000	73.24 %	74.23 %	99.69 %	92.87 %	76.99 %	80.50 %	82.85 %	87.72 %	95.60 %	99.81 %
.0025	54.29 %	53.75 %	76.55 %	88.85 %	60.46 %	73.01 %	76.92 %	73.51 %	90.11 %	99.81 %
.0050	46.78 %	46.76 %	56.52 %	83.55 %	51.67 %	61.78 %	70.99 %	65.75 %	74.88 %	99.81 %
.0100	40.63 %	37.03 %	41.77 %	76.60 %	34.31 %	41.81 %	56.57 %	55.73 %	46.00 %	99.26 %
.0150	33.94 %	29.86 %	32.45 %	67.82 %	24.27 %	17.94 %	42.31 %	44.91 %	22.92 %	98.70 %
.0200	29.05 %	24.74 %	26.71 %	56.67 %	15.69 %	8.58 %	30.29 %	36.35 %	14.13 %	97.96 %
.0300	21.41 %	17.75 %	18.94 %	41.50 %	7.32 %	1.87 %	17.63 %	22.46 %	5.18 %	92.96 %
.0400	16.05 %	13.62 %	12.89 %	30.53 %	4.60 %	.62 %	9.29 %	13.09 %	2.67 %	86.67 %
.0500	12.39 %	11.26 %	9.94 %	23.95 %	1.67 %	.47 %	3.21 %	7.92 %	1.10 %	79.63 %
.0750	8.10 %	5.97 %	4.66 %	14.63 %	.21 %	.16 %	.32 %	3.39 %	.16 %	53.89 %
.1000	4.43 %	2.90 %	2.17 %	9.32 %	0.00 %	0.00 %	.16 %	.32 %	0.00 %	32.59 %
.1250	2.60 %	1.19 %	1.09 %	4.39 %	0.00 %	0.00 %	.16 %	0.00 %	0.00 %	18.70 %
.1500	1.38 %	.17 %	.31 %	1.83 %	0.00 %	0.00 %	.16 %	0.00 %	0.00 %	11.30 %
.2000	.31 %	.17 %	.16 %	.55 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	4.63 %
.3000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	.19 %
.4000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
.6000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
.8000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %

TABLE 8.3 FREQUENCY DISTRIBUTION OF 6-HOUR AVERAGES 9/ 4/70 TO 12/ 1/70

PERCENT ABOVE	OZONE CHEM	OZONE GAS PH	OXIDANT COUL	OXIDANT COLOR	SO2 COLOR	SO2 FPD	SO2 COUL	SO2 COND	SO2 GC-FPD	NO2 COLOR
-.0050	100.00 %	98.02 %	100.00 %	97.89 %	96.29 %	92.05 %	91.85 %	100.00 %	99.39 %	100.00 %
-.0020	99.70 %	97.69 %	100.00 %	97.54 %	89.56 %	86.85 %	87.46 %	99.37 %	97.55 %	100.00 %
0.0000	83.09 %	81.52 %	99.70 %	93.33 %	80.32 %	81.35 %	84.33 %	90.51 %	96.33 %	100.00 %
.0025	66.47 %	64.36 %	82.83 %	90.88 %	61.85 %	74.31 %	78.37 %	78.16 %	90.83 %	100.00 %
.0050	55.19 %	54.79 %	65.96 %	86.67 %	51.81 %	65.75 %	74.29 %	68.35 %	79.20 %	99.64 %
.0100	44.21 %	40.26 %	47.29 %	80.00 %	37.35 %	44.34 %	58.62 %	55.70 %	47.40 %	99.28 %
.0150	35.01 %	32.01 %	35.24 %	70.88 %	24.10 %	18.96 %	44.20 %	46.52 %	25.69 %	99.28 %
.0200	29.67 %	25.08 %	27.41 %	61.75 %	18.47 %	8.56 %	32.60 %	37.66 %	13.76 %	98.57 %
.0300	20.77 %	15.84 %	15.66 %	42.81 %	7.63 %	1.22 %	16.61 %	20.89 %	4.59 %	94.27 %
.0400	13.65 %	11.88 %	11.75 %	31.58 %	[illegible] %	.31 %	7.84 %	13.29 %	1.83 %	87.46 %
.0500	10.68 %	9.57 %	8.43 %	23.86 %	[illegible]	.31 %	1.25 %	6.33 %	.92 %	81.00 %
.0750	7.72 %	5.28 %	3.92 %	12.63 %	0.00 %	0.00 %	.31 %	2.53 %	0.00 %	56.63 %
.1000	4.75 %	2.31 %	1.81 %	8.77 %	0.00 %	0.00 %	.31 %	0.00 %	0.00 %	33.69 %
.1250	1.48 %	.33 %	.60 %	5.26 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	19.00 %
.1500	.59 %	.33 %	.60 %	2.11 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	12.90 %
.2000	0.00 %	0.00 %	0.00 %	.35 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	3.23 %
.3000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
.4000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
.6000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
.8000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %

TABLE 8.4 FREQUENCY DISTRIBUTION OF 12-HOUR AVERAGES

9/15/70 TO 11/30/70

PERCENT ABOVE	OZONE CHEM	OZONE GAS PH	OXIDANT COUL	OXIDANT COLOR	SO2 COLOR	SO2 FPD	SO2 COUL	SO2 COND	SO2 GC-FPD	NO2 COLOR
-.0050	100.00 %	99.33 %	100.00 %	97.14 %	92.48 %	91.98 %	92.41 %	100.00 %	100.00 %	100.00 %
-.0020	100.00 %	98.00 %	100.00 %	97.14 %	91.60 %	87.65 %	86.71 %	99.37 %	98.78 %	100.00 %
0.0000	94.05 %	85.33 %	100.00 %	94.29 %	81.51 %	84.57 %	84.18 %	92.41 %	98.17 %	100.00 %
.0025	71.43 %	66.67 %	87.88 %	92.14 %	63.87 %	75.93 %	80.38 %	79.11 %	92.68 %	100.00 %
.0050	64.29 %	60.00 %	72.73 %	87.86 %	49.58 %	62.96 %	75.32 %	70.89 %	80.49 %	100.00 %
.0100	55.36 %	52.00 %	56.36 %	83.57 %	33.61 %	45.68 %	56.96 %	58.23 %	46.95 %	100.00 %
.0150	46.43 %	40.67 %	42.42 %	76.43 %	22.69 %	18.52 %	44.30 %	47.47 %	24.89 %	99.27 %
.0200	35.12 %	28.67 %	30.30 %	62.86 %	14.29 %	8.02 %	32.91 %	36.71 %	11.59 %	98.54 %
.0300	23.21 %	19.33 %	20.00 %	46.43 %	6.72 %	.62 %	16.46 %	22.78 %	4.27 %	93.43 %
.0400	17.86 %	12.67 %	14.55 %	32.86 %	3.36 %	0.00 %	6.33 %	11.39 %	1.22 %	87.59 %
.0500	14.88 %	10.00 %	7.27 %	25.00 %	0.00 %	0.00 %	.63 %	6.33 %	.61 %	81.75 %
.0750	2.98 %	1.33 %	1.21 %	15.71 %	0.00 %	0.00 %	0.00 %	1.90 %	0.00 %	59.12 %
.1000	1.19 %	0.00 %	0.00 %	7.86 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	35.04 %
.1250	0.00 %	0.00 %	0.00 %	2.14 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	19.71 %
.1500	0.00 %	0.00 %	0.00 %	1.43 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	9.49 %
.2000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	.73 %
.3000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
.4000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
.6000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
.8000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %

TABLE 8.5 FREQUENCY DISTRIBUITON OF 24-HOUR AVERAGES

9/ 4/70 TO 12/ 1/70

PERCENT ABOVE	OZONE CHEM	OZONE GAS PH	OXIDANT COUL	OXIDANT COLOR	SO2 COLOR	SO2 FPD	SO2 COUL	SO2 COND	SO2 GC-FPD	NO2 COLOR
-.0050	100.00 %	100.00 %	100.00 %	97.01 %	100.00 %	92.59 %	93.67 %	100.00 %	100.00 %	100.00 %
-.0020	100.00 %	100.00 %	100.00 %	97.01 %	96.55 %	90.12 %	91.14 %	100.00 %	100.00 %	100.00 %
0.0000	100.00 %	100.00 %	100.00 %	95.52 %	86.21 %	83.95 %	88.61 %	96.20 %	100.00 %	100.00 %
.0025	95.24 %	96.00 %	97.56 %	95.52 %	63.79 %	77.78 %	81.01 %	84.81 %	97.59 %	100.00 %
.0050	34.52 %	92.67 %	91.46 %	94.03 %	51.72 %	71.60 %	79.75 %	74.68 %	87.95 %	100.00 %
.0100	66.67 %	82.67 %	79.73 %	88.06 %	32.76 %	45.68 %	63.29 %	65.82 %	49.40 %	100.00 %
.0150	54.76 %	42.67 %	50.00 %	80.60 %	22.41 %	18.52 %	46.84 %	53.16 %	20.48 %	100.00 %
.0200	44.05 %	33.33 %	41.46 %	71.64 %	13.79 %	1.23 %	29.11 %	40.51 %	12.05 %	98.53 %
.0300	26.19 %	16.00 %	14.63 %	49.25 %	6.90 %	0.80 %	8.86 %	21.52 %	1.20 %	95.59 %
.0400	9.52 %	1.33 %	2.44 %	37.31 %	3.45 %	0.00 %	3.80 %	11.39 %	1.20 %	89.71 %
.0500	1.19 %	0.00 %	1.22 %	26.87 %	0.00 %	0.00 %	1.27 %	7.59 %	0.00 %	83.82 %
.0750	0.00 %	0.00 %	0.00 %	14.93 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	58.82 %
.1000	0.00 %	0.00 %	0.00 %	4.48 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	39.71 %
.1250	0.00 %	0.00 %	0.00 %	1.49 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	14.71 %
.1500	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.80 %	0.00 %	0.00 %	0.00 %	7.35 %
.2000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
.3000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.80 %	0.00 %	0.00 %	0.00 %	0.00 %
.4000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
.6000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
.8000	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %

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APPENDIX A

COMPUTER PROGRAMS

The purpose of each computer program is described in Section 6.0. These programs are too numerous and too complex to be useful in a general report. They are, however, included in Copy No. 1 of this report.

APPENDIX B

AIR QUALITY DATA FROM O_3, O_x, SO_2, H_2S and NO_2 INSTRUMENTS

B.1 Five-Minute Data (Included in Copies 1-4 Only)

The output data from each instrument and the meteorological sensors and the meteorological sensors is printed every five minutes two hours per page. An example is shown on the following page. Mode symbols are described in Table 5.1. The full data consisting of over 1000 pages from September 4 to December 1, 1970 is included in Copies 1-4 of the report.

B.2 Hourly Averages - Before Continuous Drift Corrections (Included in Copies 1-4 Only)

The five-minute data was averaged for one hour to give the hourly averages. Printout follows the same format except that it is condensed to one day per page. This 90-page appendix is included only in Copies 1-4 of the report.

B.3 Hourly Averages - After Continuous Drift Corrections (Included in Copies 1-4 Only)

B.4 Three-Hour Averages (Included in Copies 1-4 Only)

APPENDIX B.5

Air Quality Data From O_3, O_x, SO_2, H_2S and NO_2 Instruments, Six-Hour Averages

MOBILE VAN LOCATION = LOS ANGELES; CALIFORNIA

SEP 1970

TIME (PCT)	DAY	************* OZONE (PPM) ************* CHEM	GAS PH	COUL	COLOR	* OXIDANT (PPM) * COUL	COLOB	****************** SO2 (PPM) ****************** COLOR	FPD	COUL	COND	GC-FPD
6-11	4	.0143	9.9999	.0250	.1160	.0196	.1294	.0067	9.9999	9.9999	9.9999	.0131
12-17	4	.0361	9.9999	.0505	.1109	.0394	.1113	-.0032	.0025	9.9999	.0696	.0021
18-23	4	.0046	9.9999	.0109	.0727	.0104	.0785	-.0033	-.0025	9.9999	.0218	.0012
0- 5	5	.0227	9.9999	.0187	.0848	.0183	.0885	-.0055	-.0009	9.9999	.0166	.0011
6-11	5	.0361	9.9999	.0332	.1080	.0275	.1072	-.0045	.0027	9.9999	.0303	.0016
12-17	5	.0563	9.9999	.0519	.1009	.0503	.1104	.0005	.0050	9.9999	.0707	.0034
18-23	5	.0301	9.9999	.0262	.1132	.0232	.1174	-.0017	.0013	9.9999	.0274	.0018
0- 5	6	0.0000	9.9999	.0056	.0991	.0054	.1118	-.0024	.0030	9.9999	.0262	.0020
6-11	6	.0401	9.9999	.0492	.1572	.0347	.1524	.0040	.0074	9.9999	.0487	9.9999
12-17	6	.0752	9.9999	.0930	.2025	.0683	.1845	.0036	.0097	9.9999	.0944	.0113
18-23	6	.0219	9.9999	.0248	.1335	.0127	.1296	.0021	.0076	9.9999	.0423	9.9999
0- 5	7	.0126	9.9999	.0101	.1111	.0065	.1142	-.0032	.0023	9.9999	.0232	9.9999
6-11	7	.0226	9.9999	.0274	.1344	.0180	.1365	.0003	.0058	9.9999	.0460	9.9999
12-17	7	.0491	9.9999	.0544	.0783	.0313	.0596	.0028	.0094	9.9999	.0824	.0083
18-23	7	.0143	9.9999	.0179	.0057	.0091	.0034	.0046	.0055	9.9999	.0362	.0036
0- 5	8	0.0000	9.9999	.0110	.0069	-.0007	.0025	.0090	.0107	9.9999	.0372	.0068
6-11	8	.0121	9.9999	.0152	.0104	.0154	.0268	.0104	.0081	9.9999	.0606	.0055
12-17	8	.0154	9.9999	.0322	.0246	.0079	.0056	.0190	.0191	9.9999	.0841	.0108
18-23	8	.0041	9.9999	.0118	.0071	.0028	.0042	.0169	.0039	.0036	.0355	.0025
0- 5	9	0.0000	9.9999	.0095	.0060	.0010	.0044	.0159	.0049	.0044	.0346	.0024
6-11	9	.0085	9.9999	.0291	.0419	.0152	.0501	.0109	.0139	.0278	.0714	.0089
12-17	9	.0250	9.9999	.0342	.0155	.0140	.0075	-.0082	.0205	.0493	.0975	.0167
18-23	9	.0354	9.9999	.0217	.0104	.0152	.0126	-.0103	.0079	.0118	.0443	.0040

		*** H2S (PPM) *** GC-FPD	COLOR	AVERAGE OX(PPM)	NO2(PPM) COLOR	SOLAR RADIATION (LANGLEYS)	****WIND ***** DIRECT (DEG)	SPEED (MPH)	TEMP (DEG C) AMB OUT	DEW POINT	AVERAGE SO2(PPM)
6-11	4	.0025	9.9999	.0745	.1804	99.99	999.9	999.9	999.99	999.99	.0146
12-17	4	.0017	9.9999	.0754	.1099	.85	274.8	7.2	21.43	12.43	.0177
18-23	4	.0015	9.9999	.0444	.0599	.02	235.6	3.5	17.99	12.09	.0041
0- 5	5	.0015	9.9999	.0534	.0396	0.00	99.4	3.5	17.16	12.45	.0028
6-11	5	.0013	9.9999	.0673	.0464	.51	138.6	2.2	19.43	11.26	.0085
12-17	5	.0013	9.9999	.0803	.0350	.80	268.7	8.4	22.27	11.58	.0173
18-23	5	.0016	9.9999	.0703	.0687	.02	262.1	3.6	19.20	11.04	.0072
0- 5	6	.0019	9.9999	.0586	.1222	0.00	49.2	1.9	17.54	10.63	.0075
6-11	6	9.9999	9.9999	.0935	.0928	.53	75.5	2.2	22.87	8.03	.0201
12-17	6	.0001	9.9999	.1109	.0691	.81	283.6	6.1	29.63	6.64	.0297
18-23	6	9.9999	9.9999	.0711	.0772	.02	247.4	4.6	21.38	12.46	.0167
0- 5	7	9.9999	9.9999	.0603	.0642	0.00	160.7	1.6	18.91	14.97	.0075
6-11	7	9.9999	9.9999	.0773	.1085	.48	195.1	1.2	20.75	14.43	.0159
12-17	7	.0019	9.9999	.0454	.0424	.80	291.1	7.6	24.95	14.30	.0257
18-23	7	.0014	9.9999	.0063	.0620	.02	262.8	4.3	18.97	14.90	.0125
0- 5	8	.0017	9.9999	.0009	.0698	0.00	235.4	1.1	17.95	14.46	.0159
6-11	8	.0017	9.9999	.0211	.1774	.47	248.6	2.2	20.55	14.63	.0212
12-17	8	.0020	9.9999	.0067	.0570	.79	261.0	7.9	23.62	13.64	.0332
18-23	8	.0013	9.9999	.0035	.0581	.02	267.0	3.9	17.93	13.53	.0125
0- 5	9	.0013	9.9999	.0027	.0659	0.00	239.7	1.1	17.31	13.41	.0124
6-11	9	.0019	9.9999	.0326	.2110	.46	234.4	1.9	20.59	13.85	.0266
12-17	9	.0022	9.9999	.0107	.0823	.77	289.6	7.3	25.07	14.04	.0333
18-23	9	.0014	9.9999	.0139	.0831	.01	268.5	4.1	19.06	14.42	.0115

MOBILE VAN LOCATION = LOS ANGELES, CALIFORNIA

SEP 1970

TIME DAY (PCT)	************ OZONE (PPM) ************				* OXIDANT (PPM) *		****************** SO2 (PPM) ******************				
	CHEM	GAS PH	COUL	COLOR	COUL	COLOR	COLOR	FPD	COUL	COND	GC-FPD
0- 5 10	0.0000	9.9999	.0127	-.0009	.0015	-.0011	-.0049	.0132	.0212	.0496	.0085
6-11 10	.0089	9.9999	.0145	-.0009	.0111	.0229	-.0031	.0178	.0376	.0808	.0125
12-17 10	.0979	9.9999	.1037	.1254	.0721	.1041	.0098	.0288	.0371	.0883	.0230
18-23 10	.0112	9.9999	.0194	.0192	.0101	.0185	-.0023	.0094	.0114	.0456	.0070
0- 5 11	0.0000	9.9999	.0107	.0010	.0009	-.0011	-.0039	.0082	.0175	.0435	.0058
6-11 11	.0153	9.9999	.0403	-.1362	.0193	-.1359	.0044	.0236	.0450	.0724	.0199
12-17 11	.0966	9.9999	.1047	-.0851	.0721	-.1069	.0104	.0318	.0388	.0888	.0260
18-23 11	.0074	9.9999	.0184	-.2701	.0068	-.2729	-.0005	.0129	.0133	.0480	.0092
0- 5 12	.0271	9.9999	.0320	-.2694	.0189	-.2800	-.0012	.0130	.0094	.0427	.0087
6-11 12	.0215	9.9999	.0285	-.2840	.0144	-.2951	-.0006	.0124	.0123	.0393	.0108
12-17 12	.0483	9.9999	.0514	.0517	.0404	.0464	.0049	.0094	.0152	.0272	.0076
18-23 12	.0336	9.9999	.0299	.0334	.0267	.0335	.0016	.0054	.0053	.0085	.0045
0- 5 13	.0070	9.9999	.0134	.0094	.0029	.0037	.0069	.0130	.0144	.0187	.0133
6-11 13	.0170	9.9999	.0147	.0147	.0091	.0105	.0024	.0078	.0121	.0143	.0100
12-17 13	.0323	.0376	.0278	.0021	.0237	.0008	.0022	.0037	.0075	.0108	.0042
18-23 13	.0166	.0158	.0142	-.0047	.0148	-.0001	-.0005	-.0003	.0023	.0044	.0023
0- 5 14	.0148	.0066	.0112	-.0067	.0125	-.0810	-.0012	-.0009	.0019	.0038	.0021
6-11 14	.0164	.0134	.0114	-.0051	.0130	-.0008	.0051	.0087	.0123	.0163	.0077
12-17 14	.0490	.0413	.0366	-.0020	.0342	.0827	.0047	.0058	.0071	.0182	.0061
18-23 14	.0110	.0036	.0102	-.0101	.0124	-.0017	.0004	-.0028	-.0089	.0072	.0027
0- 5 15	.0019	-.0062	.0080	-.0042	.0029	-.0011	.0065	.0062	.0126	.0164	.0078
6-11 15	.0225	.0177	.0342	.0038	.0289	.0160	.0075	.0091	.0234	.0276	.0091
12-17 15	.0854	.0242	.0759	.0519	.0701	.0531	.0013	.0148	.0254	.0349	.0073
18-23 15	.0080	.0078	.0109	-.0091	.0115	.0001	-.0012	-.0003	.0117	.0088	.0032

	*** H2S (PPM) ***		AVERAGE	NO2(PPM)	SOLAR RADIATION (LANGLEYS)	**** WIND *****		TEMP (DEG C)		AVERAGE
	GC-FPD	COLOR	OX(PPM)	COLOR		DIRECT (DEG)	SPEED (MPH)	AMB OUT	DEW POINT	SO2(PPM)
0- 5 10	.0017	9.9999	.0002	.1048	0.00	280.3	.6	18.69	14.14	.0175
6-11 10	.0021	9.9999	.0170	.1521	.46	228.6	2.5	21.55	14.67	.0290
12-17 10	.0026	9.9999	.0881	.0975	.77	291.1	6.5	26.75	14.71	.0374
18-23 10	.0018	9.9999	.0143	.0818	.01	259.5	3.4	20.30	14.65	.0142
0- 5 11	.0018	9.9999	-.0001	.0733	0.00	222.4	.6	19.30	14.66	.0142
6-11 11	.0024	9.9999	-.0583	.2023	.44	238.5	2.4	22.09	15.25	.0331
12-17 11	.0025	9.9999	-.0174	.1026	.73	278.7	7.3	25.57	15.17	.0388
18-23 11	.0017	9.9999	-.1331	.0834	.01	257.3	4.5	19.19	14.74	.0166
0- 5 12	.0017	9.9999	-.1305	.0233	0.00	160.8	3.6	19.20	15.20	.0145
6-11 12	.0016	9.9999	-.1403	.0336	.13	182.0	3.2	19.65	15.09	.0161
12-17 12	.0016	9.9999	.0425	.0419	.69	267.2	7.1	22.26	14.79	.0135
18-23 12	.0016	9.9999	.0301	.0311	.00	277.2	5.9	17.83	13.62	.0051
0- 5 13	.0019	9.9999	.0033	.0458	0.00	267.9	3.4	17.75	12.84	.0133
6-11 13	.0017	9.9999	.0104	.0323	.25	272.7	2.7	18.40	11.81	.0096
12-17 13	.0003	9.9999	.0123	.0268	.57	280.1	8.3	20.28	11.95	.0057
18-23 13	.0007	9.9999	.0074	.0382	.01	299.7	4.8	17.65	11.30	.0016
0- 5 14	.0007	9.9999	.0057	.0410	0.00	281.3	2.2	17.29	10.62	.0011
6-11 14	.0008	9.9999	.0061	.0729	.42	222.1	2.3	18.52	10.47	.0100
12-17 14	-.0008	9.9999	.0185	.0598	.73	283.9	8.4	20.57	11.64	.0084
18-23 14	-.0001	9.9999	.0054	.0592	.01	279.7	4.7	17.38	11.24	.0013
0- 5 15	.0007	9.9999	.0008	.0789	0.00	90.6	1.1	15.55	11.03	.0099
6-11 15	.0004	9.9999	.0224	.1671	.46	77.1	1.9	18.59	10.74	.0153
12-17 15	-.0011	9.9999	.0601	.0873	.74	292.3	7.3	23.42	11.03	.0186
18-23 15	-.0001	9.9999	.0058	.0828	.01	281.6	3.3	18.49	12.27	.0044

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          MOBILE VAN LOCATION =  LOS ANGELES, CALIFORNIA                                                     SEP 1970

               ************ OZONE (PPM) ************      * OXIDANT (PPM) *     ****************** SO2 (PPM) ******************
 TIME DAY
 (PCT)         CHEM      GAS PH      COUL      COLOR        COUL      COLOR       COLOR      FPD       COUL      COND     GC-FPD

  0- 5 16    0.0000     -.0019      .0055     -.0106       .0030     -.0001      -.0039     .0078     .0190     .0191     .0074
  6-11 16     .0423      .0336      .0268      .0025       .0447      .0449      -.0027     .0129     .0299     .0329     .0121
 12-17 16     .1154      .1032      .1037      .0677       .0799      .0619       .0332     .0277     .0363     .0611     .0260
 18-23 16     .0035      .0050      .0087     -.0075       .0072      .0032       .0043     .0064     .0182     .0154     .0061
  0- 5 17    -.0012     -.0011      .0123     -.0026       .0037      .0038       .0105     .0141     .0280     .0261     .0097
  6-11 17     .0245      .0232      .0219      .0023       .0265      .0085       .0240     .0280     .0532     .0478     .0200
 12-17 17     .1118      .0993     9.9999     9.9999       .0820      .0209       .0218     .0205     .0316     .0463     .0164
 18-23 17     .0028      .0053     9.9999     9.9999       .0083      .0833       .0026     .0058     .0098     .0172     .0052
  0- 5 18    0.0000     -.0010     9.9999     9.9999       .0049      .0811      -.0027     .0029     .0065     .0128     .0026
  6-11 18     .0246      .0196     9.9999     9.9999       .0261      .0002       .0085     .0153     .0315     .0433     .0104
 12-17 18     .1157      .0931     9.9999     9.9999       .0904     9.9999       .0165     .0135     .0198     .0464     .0115
 18-23 18     .0115      .0085     9.9999     9.9999       .0161     9.9999       .0012     .0008     .0030     .0066     .0038
  0- 5 19    -.0025     -.0033     9.9999     9.9999       .0059     9.9999       .0013     .0049     .0079     .0082     .0050
  6-11 19     .0149      .0173     9.9999     9.9999       .0187     9.9999       .0139     .0207     .0319     .0501     .0168
 12-17 19     .1009      .0206     9.9999     9.9999       .0259     9.9999      9.9999    9.9999     .0289     .0556     .0184
 18-23 19     .0251      .0209     9.9999     9.9999       .0230     9.9999      9.9999    9.9999     .0048     .0069     .0050
  0- 5 20    -.0005      .0041     9.9999     9.9999       .0012     9.9999      9.9999    9.9999     .0238     .0288     .0154
  6-11 20     .0113      .0174     9.9999     9.9999       .0128     9.9999      9.9999    9.9999     .0146     .0209     .0116
 12-17 20     .1111      .1195     9.9999     9.9999       .1144      .1302       .0121    9.9999     .0157     .0292     .0162
 18-23 20     .0183      .0190     9.9999     9.9999       .0168      .0364       .0007    9.9999     .0062     .0053     .0060
  0- 5 21     .0086      .0084     9.9999     9.9999       .0063      .0253       .0026    9.9999     .0122     .0125     .0091
  6-11 21     .0203      .0187     9.9999     9.9999       .0165     9.9999      -.0000    9.9999     .0142     .0158     .0093
 12-17 21     .0731      .0573     9.9999     9.9999       .0504      .0942       .0058    9.9999     .0168     .0282     .0086
 18-23 21     .0386      .0279     9.9999     9.9999       .0323      .0733       .0002    9.9999     .0071     .0074     .0053

               *** H2S (PPM) ***     AVERAGE    NO2(PPM)       SOLAR       ***$ WIND *$***           TEMP  (DEG C)      AVERAGE
                                                              RADIATION     DIRECT    SPEED           AMB       DEW
               GC-FPD      COLOR     OX(PPM)     COLOR       (LANGLEYS)     (DEG)     (MPH)           OUT       POINT     SO2(PPM)
  0- 5 16      .0008      9.9999      .0014      .1240          0.00          72.9        .8          16.90     11.73      .0099
  6-11 16      .0011      9.9999      .0448      .2221           .45          98.1       1.5          21.37     10.38      .0182
 12-17 16      .0004      9.9999      .0709      .1212           .72         296.4       6.6          25.95     11.87      .0390
 18-23 16      .0001      9.9999      .0052      .1159           .01         261.2       2.6          20.03     12.79      .0085
  0- 5 17      .0010      9.9999      .0037      .1438          0.00          72.3        .9          18.12     11.88      .0173
  6-11 17      .0020      9.9999      .0175      .2308           .41         201.4       2.4          20.00     12.52      .0353
 12-17 17      .0025     -.0015       .0514     9.9999           .71         299.0       5.5          25.81     13.64      .0273
 18-23 17      .0015     -.0004       .0058     9.9999           .01         283.9       3.9          19.19     13.93      .0081
  0- 5 18      .0011      .0008       .0030     9.9999          0.00         258.5       1.1          17.25     14.01      .0043
  6-11 18      .0023      .0018       .0242     9.9999           .44         228.1       2.7          19.44     13.86      .0218
 12-17 18      .0030      .0010       .0904     9.9999           .74         297.4       6.2          25.00     11.27      .0216
 18-23 18      .0021      .0019       .0161     9.9999           .01         285.1       4.7          17.46     12.61      .0031
  0- 5 19      .0019      .0022       .0059     9.9999          0.00         232.3       1.6          16.64     12.30      .0055
  6-11 19      .0030      .0024       .0187     9.9999           .44         177.7       1.3          17.70     11.86      .0336
 12-17 19      .0025     -.0015       .0759     9.9999           .77         294.4       6.3          23.77     11.18      .0343
 18-23 19      .0017     -.0010       .0230     9.9999           .01         271.4       3.8          17.70     12.37      .0056
  0- 5 20      .0025     -.0007       .0012     9.9999          0.00         149.5       2.0          16.96     12.48      .0227
  6-11 20      .0019     -.0005       .0128     9.9999           .46         156.1       1.8          18.29     11.88      .0156
 12-17 20      .0029     -.0004       .1226     9.9999           .73         273.6       6.8          23.99     10.30      .0199
 18-23 20      .0027     -.0003       .0266     9.9999           .01         265.9       3.0          19.03     11.99      .0046
  0- 5 21      .0027     -.0003       .0158     9.9999          0.00         118.5       2.3          17.95     13.18      .0091
  6-11 21      .0026     -.0002       .0219     9.9999           .41         147.3       2.4          19.13     13.05      .0098
 12-17 21      .0020     -.0004       .0689     9.9999           .70         284.7       6.8          23.24     12.89      .0149
 18-23 21      .0005     -.0002       .0528     9.9999           .01         276.5       3.1          19.49     13.58      .0050
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MOBILE VAN LOCATION = LOS ANGELES, CALIFORNIA

SEP 1970

TIME DAY (PCT)	************ OZONE (PPM) ************ CHEM	GAS PH	COUL	COLOR	* OXIDANT (PPM) * COUL	COLOR	****************** SO2 (PPM) ****************** COLOR	FPD	COUL	COND	GC-FPD
0- 5 22	0.0000	-.0013	9.9999	9.9999	.0051	.0501	.0082	9.9999	.0176	.0258	.0091
6-11 22	0.0000	-.0005	9.9999	9.9999	.0075	.0599	.0229	9.9999	.0387	.0618	.0163
12-17 22	.0868	.0676	.0753	.1505	.0676	.1542	.0061	.0083	.0199	.0551	.0146
18-23 22	.0045	.0074	.0160	.0536	.0105	.0640	.0103	.0073	.0196	.0226	.0135
0- 5 23	0.0000	.0008	.0157	.0240	.0021	.0231	.0190	.0129	.0275	.0277	.0167
6-11 23	0.0000	.0147	.0282	.0315	.0162	.0616	.0270	.0210	.0376	.0431	.0210
12-17 23	.0942	.0893	.0969	.1781	.0733	.1651	.0254	.0196	.0227	.0466	.0163
18-23 23	.0037	.0037	.0194	.0534	.0059	.0526	.0256	.0165	.0285	.0271	.0138
0- 5 24	0.0000	-.0004	.0082	.0198	.0011	.0229	.0143	.0119	.0157	9.9999	.0085
6-11 24	.0186	.0170	.0101	.0322	.0179	.0796	.0174	.0195	.0286	9.9999	.0121
12-17 24	.1049	.0881	.0798	.1787	.0685	.1835	9.9999	.0293	.0312	9.9999	.0179
18-23 24	.0065	.0062	.0103	.0180	.0082	.0300	9.9999	.0130	.0099	9.9999	.0075
0- 5 25	.0026	.0034	.0073	.0165	.0055	.0283	9.9999	.0131	.0181	9.9999	.0055
6-11 25	0.0000	.0041	.0171	.0148	.0085	.0281	9.9999	.0237	.0499	9.9999	.0118
12-17 25	.1788	9.9999	9.9999	9.9999	.1562	.2481	.0059	.0159	.0243	9.9999	.0150
18-23 25	0.0000	.0051	.0107	.0241	.0022	.0267	.0111	.0114	.0255	9.9999	.0114
0- 5 26	0.0000	.0040	.0199	.0233	.0007	.0165	.0204	.0211	.0478	9.9999	.0156
6-11 26	.0052	.0114	9.9999	.0365	9.9999	.0371	.0211	.0222	.0396	9.9999	.0165
12-17 26	.1016	.0983	9.9999	.1449	9.9999	.1446	.0159	.0146	.0186	9.9999	.0113
18-23 26	.0036	.0091	9.9999	.0391	9.9999	.0482	9.9999	.0123	.0312	9.9999	.0080
0- 5 27	0.0000	.0054	9.9999	.0232	9.9999	.0292	9.9999	.0100	.0272	9.9999	.0061
6-11 27	.0156	.0252	9.9999	.0259	9.9299	.0334	9.9999	.0031	.0183	9.9999	.0033
12-17 27	.0771	.0864	9.9999	.1100	9.9999	.0904	9.9999	.0067	.0071	9.9999	.0058
18-23 27	.0077	.0141	9.9999	.0236	9.9999	.0299	9.9999	.0085	.0190	9.9999	.0065

	*** H2S (PPM) *** GC-FPD	COLOR	AVERAGE OX(PPM)	NO2(PPM) COLOR	SOLAR RADIATION (LANGLEYS)	***** WIND ***** DIRECT (DEG)	SPEED (MPH)	TEMP (DEG C) AMB OUT	DEW POINT	AVERAGE SO2(PPM)
0- 5 22	.0009	-.0001	.0277	9.9999	0.00	74.4	1.3	18.43	13.06	.0150
6-11 22	.0017	0.0000	.0282	9.9999	.47	75.8	3.0	22.78	10.90	.0355
12-17 22	.0024	.0001	.0970	.1239	.71	302.4	5.9	31.22	3.87	.0237
18-23 22	.0044	.0002	.0372	.1522	.00	14.4	2.9	25.07	2.78	.0147
0- 5 23	.0023	.0003	.0126	.1202	-.00	56.1	2.5	20.59	-.12	.0208
6-11 23	.0014	.0004	.0389	.1586	.46	96.0	2.9	23.45	.08	.0299
12-17 23	.0014	.0033	.1192	.0839	.70	258.8	6.7	28.83	2.83	.0261
18-23 23	.0006	.0033	.0292	.1204	.01	249.5	2.9	22.35	11.71	.0207
0- 5 24	.0018	.0035	.0120	.0966	0.00	149.2	1.1	21.47	15.24	.0129
6-11 24	.0023	.0041	.0487	.1640	.42	145.7	1.9	21.08	12.95	.0201
12-17 24	.0023	.0049	.1260	.1373	.66	284.2	6.3	25.55	12.34	.0262
18-23 24	.0014	.0050	.0191	.1340	.01	292.0	4.6	20.07	14.02	.0101
0- 5 25	.0011	.0053	.0169	.1292	0.00	141.6	1.4	20.17	13.64	.0095
6-11 25	.0016	.0056	.0172	.2414	.42	152.3	1.5	22.54	11.15	.0285
12-17 25	.0021	.0047	.1961	9.9999	.65	288.0	5.8	33.74	5.09	.0167
18-23 25	.0022	.0049	.0145	.1058	-.00	131.9	2.1	28.89	-4.45	.0148
0- 5 26	.0020	.0052	.0086	.1174	-.01	62.3	2.9	20.11	-4.15	.0262
6-11 26	.0021	.0054	.0360	.1540	.50	60.0	2.7	23.79	-2.36	.0249
12-17 26	.0015	.0053	.1446	.0895	.72	300.7	5.9	34.08	1.48	.0151
18-23 26	.0004	.0056	.0482	.1623	-.00	30.4	2.3	27.73	-3.68	.0176
0- 5 27	.0003	.0059	.0292	.1238	-.01	49.8	4.5	23.06	-4.15	.0144
6-11 27	0.0000	.0061	.0334	.0797	.48	75.3	3.0	27.77	-2.39	.0056
12-17 27	-.0006	.0076	.0904	.0432	.65	192.8	5.0	36.33	3.39	.0066
18-23 27	0.0000	.0075	.0299	.1071	-.00	359.5	3.9	28.37	-.70	.0114

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       MOBILE VAN LOCATION =  LOS ANGELES; CALIFORNIA                                                  SEP 1970

               ************* OZONE (PPM) *************      * OXIDANT (PPM) *     ****************** SO2 (PPM) ******************
   TIME DAY
   (PCT)        CHEM     GAS PH      COUL      COLOR       COUL      COLOR       COLOR      FPD       COUL      COND     GC-FPD

    0- 5 28   0.0000      .0096    9.9999      .0148     9.9999      .0187      9.9999     .0095     .0248    9.9999     .0048
    6-11 28    .0084      .0099    9.9999      .0191     9.9999      .0207      9.9999     .0088     .0276    9.9999     .0057
   12-17 28   9.9999     9.9999    9.9999     9.9999     9.9999     9.9999      9.9999     .0104     .0232    9.9999     .0089
   18-23 28    .0042     -.0067     .0122      .0321      .0077      .0389      9.9999     .0048     .0211    9.9999     .0070
    0- 5 29   0.0000     -.0090     .0098      .0272      .0044      .0322      9.9999     .0061     .0201    9.9999     .0079
    6-11 29    .0172      .0243    9.9999     9.9999      .0267      .0562      9.9999    9.9999    9.9999    9.9999     .0103
   12-17 29    .0595      .0367     .0616      .1163      .0482      .1101      9.9999    9.9999    9.9999    9.9999     .0209
   18-23 29    .0113     -.0006     .0189      .0700      .0214      .0904      -.0006     .0098     .0148     .0075     .0073
    0- 5 30   -.0003     -.0083     .0218      .0541      .0106      .0629       .0144     .0164     .0420     .0254     .0151
    6-11 30    .0127      .0007     .0175      .0490      .0133      .0591       .0024     .0122     .0376     .0208     .0122
   12-17 30    .1165      .0244     .0716     9.9999      .0923     9.9999      -.0020     .0118     .0267     .0201     .0133
   18-23 30    .0134      .0002     .0187     9.9999      .0218     9.9999      -.0067     .0095     .0170     .0022     .0083

              *** H2S (PPM) ***   AVERAGE   NO2(PPM)     SOLAR      **** WIND *****              TEMP (DEG C)      AVERAGE
                                                       RADIATION   DIRECT   SPEED               AMB       DEW
               GC-FPD     COLOR   OX(PPM)    COLOR    (LANGLEYS)   (DEG)    (MPH)               OUT      POINT     SO2(PPM)
    0- 5 28    .0009      .0077     .0187      .1030       -.01       47.6     3.8               23.67      -.66      .0131
    6-11 28    .0008      .0078     .0207      .1016        .45       78.1     3.7               28.18      -.82      .0140
   12-17 28    .0005      .0076    9.9999      .0934        .62      292.0     7.1               32.17      1.72      .0142
   18-23 28    .0004      .1795     .0233      .1080       -.00       48.5     2.4               26.89      2.87      .0110
    0- 5 29   0.0000      .1969     .0183      .0987       -.00       47.3     3.0               23.16      1.31      .0109
    6-11 29    .0021     9.9999     .0415      .0854        .75      118.1     4.7               30.24      6.88      .0224
   12-17 29    .0019     9.9999     .0792      .0860        .60      265.0     7.4               31.18      7.41      .0203
   18-23 29    .0023     9.9999     .0559      .1707        .00      260.0     3.1               25.17      9.14      .0077
    0- 5 30    .0038     9.9999     .0367      .1909       0.00       60.1     1.2               21.91     10.04      .0226
    6-11 30    .0029     9.9999     .0283      .1722        .40       87.9     1.9               24.58      8.53      .0183
   12-17 30    .0026      .0115     .0923      .1349        .58      281.3     6.3               29.68      7.67      .0148
   18-23 30    .0020      .0112     .0218      .1536        .00      279.4     4.0               22.69      9.57      .0060
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        MOBILE VAN LOCATION =  LOS ANGELES, CALIFORNIA                                               OCT 1970

                 ************* OZONE (PPM) ************     * OXIDANT (PPM) *    ****************** SO2 (PPM) ******************
 TIME DAY
 (PCT)          CHEM     GAS PH      COUL      COLOR        COUL      COLOR      COLOR       FPD      COUL      COND     GC-FPD

  0- 5   1    -.0011    -.0089     .0135    9.9999       .0119    9.9999     -.0008     .0117    .0330     .0143     .0114
  6-11   1    -.0005    -.0078    9.9999    9.9999       .0150    9.9999     9.9999     .0146    .0468     .0282     .0187
 12-17   1     .1686     .1600    9.9999    9.9999       .1572    9.9999     9.9999     .0193    .0452     .0400     .0271
 18-23   1     .0303     .0258    9.9999    9.9999       .0280    9.9999     9.9999     .0130    .0434     .0178     .0149
  0- 5   2    0.0000    -.0006    9.9999    9.9999       .0037    9.9999     9.9999     .0125    .0473     .0153     .0126
  6-11   2    0.0000    -.0001    9.9999    9.9999       .0079    9.9999     9.9999     .0164    .0695     .0323     .0217
 12-17   2     .1102     .0988    9.9999    9.9999       .0789    9.9999     9.9999     .0262    .0683     .0411     .0300
 18-23   2    0.0000     .0002     .0250     .0181       .0025     .0096     9.9999     .0218    .0476     .0247     .0275
  0- 5   3     .0008    -.0001     .0167     .0053       .0012    -.0004     9.9999     .0158    .0352     .0149     .0188
  6-11   3     .0132     .0084     .0247     .0160       .0051     .0184     9.9999     .0208    .0476     .0334     .0267
 12-17   3     .1075     .0277     .0969     .1139       .0674     .0934      .0265     .0221    .0357     .0210     .0344
 18-23   3     .0068     .0043     .0080     .0131       .0073     .0233      .0026     .0121    .0123     .0012     .0065
  0- 5   4    0.0000    -.0003     .0036     .0016       .0029     .0117      .0004     .0115    .0150     .0009     .0065
  6-11   4     .0237     .0164     .0227     .0284       .0242     .0493      .0016     .0121    .0180     .0090     .0066
 12-17   4     .0794     .0556     .0639     .0675       .0616     .0719     -.0016     .0115    .0117     .0050     .0038
 18-23   4     .0331     .0218     .0263     .0244       .0259     .0276     -.0041     .0107    .0052    0.0000    0.0000
  0- 5   5     .0013     .0001     .0037     .0017       .0019     .0073      .0005     .0119    .0126     .0005     .0049
  6-11   5     .0019     .0011     .0119     .0046       .0015     .0072      .0108     .0167    .0288     .0122     .0135
 12-17   5     .0254     .0174     .0208     .0229       .0203     .0306     -.0036     .0122    .0146     .0037     .0043
 18-23   5     .0298     .0201     .0239     .0247       .0237     .0284     -.0062     .0108    .0074    0.0000     .0003
  0- 5   6     .0138     .0096     .0131     .0130       .0079     .0119      .0007     .0124    .0158     .0028     .0065
  6-11   6     .0092     .0073     .0119     .0137       .0084     .0166     -.0013     .0118    .0160     .0027     .0051
 12-17   6     .0173     .0129     .0185     .0199       .0135     .0214      .0018     .0127    .0182     .0047     .0065
 18-23   6     .0268     .0170     .0211     .0206       .0213     .0249     -.0077     .0107    .0064    0.0000     .0016

               *** H2S (PPM) ***    AVERAGE    NO2(PPM)      SOLAR      **** WIND *****              TEMP (DEG C)      AVERAGE
                                                            RADIATION    DIRECT    SPEED             AMB       DEW
               GC-FPD      COLOR    OX(PPM)     COLOR      (LANGLEYS)    (DEG)     (MPH)             OUT       POINT     SO2(PPM)
  0- 5   1     .0022       .0120     .0119      .2060          -.00       47.6       1.7             20.23      0.74      .0139
  6-11   1     .0027       .1251     .0150     9.9999           .41      101.5       1.6             23.30      6.90      .0257
 12-17   1     .0030      9.9999     .1572     9.9999           .59      287.2       5.0             29.39      7.07      .0329
 18-23   1     .0025      9.9999     .0280     9.9999          -.00      196.7       2.2             23.02     10.93      .0223
  0- 5   2     .0024      9.9999     .0037     9.9999          0.00       69.4       1.6             20.47     13.70      .0219
  6-11   2     .0029      9.9999     .0079     9.9999           .33      110.6       1.8             22.30     10.44      .0350
 12-17   2     .0041      9.9999     .0817     9.9999           .50      258.4       5.5             29.55     13.19      .0414
 18-23   2     .0027      9.9999     .0061      .1326           .00      246.3       3.8             23.50     16.52      .0304
  0- 5   3     .0019      9.9999     .0004      .0933          0.00      213.2       3.2             22.98     16.80      .0212
  6-11   3     .0026      9.9999     .0117      .1708           .22      173.9       1.6             23.09     16.50      .0321
 12-17   3     .0041      9.9999     .0804      .0853           .38      272.3       4.9             26.15     15.22      .0346
 18-23   3     .0019      9.9999     .0153      .1039           .00      272.2       3.1             22.19     14.92      .0069
  0- 5   4     .0021      9.9999     .0073      .1024          0.00      223.6        .8             23.05     16.05      .0068
  6-11   4     .0028      9.9999     .0367      .1838           .36      222.3       1.9             23.94     15.72      .0095
 12-17   4     .0006      9.9999     .0668      .0635           .57      288.1       7.8             23.26     15.27      .0061
 18-23   4    0.0000      9.9999     .0268      .0336           .00      261.7       4.7             20.55     14.65      .0023
  0- 5   5    0.0000      9.9999     .0046      .0710          0.00      246.4       2.6             19.87     14.35      .0061
  6-11   5    0.0000      9.9999     .0044      .0882           .10      243.4       3.5             19.58     14.04      .0164
 12-17   5    0.0000      9.9999     .0255      .0587           .39      272.1       6.9             20.21     13.87      .0062
 18-23   5    0.0000      9.9999     .0261      .0376           .00      275.2       4.7             19.49     14.10      .0025
  0- 5   6    0.0000      9.9999     .0098      .0391          0.00      231.5       3.1             18.89     13.61      .0076
  6-11   6    0.0000      9.9999     .0125      .0601           .08      178.7       3.5             18.88     12.93      .0070
 12-17   6    0.0000      9.9999     .0175      .0624           .16      284.8       6.6             19.54     13.79      .0088
 18-23   6    0.0000      9.9999     .0231      .0394           .00      299.5       6.5             18.78     13.48      .0022
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TIME (RCT)	DAY	************* OZONE (PPM) *************				* OXIDANT (PPM) *		****************** SO2 (PPM) ******************				
		CHEM	GAS PH	COUL	COLOR	COUL	COLOB	COLOR	FPD	COUL	COND	GC-FPD
0- 5	7	.0357	.0246	.0293	.0249	.0288	.0262	-.0081	.0107	.0055	0.0000	0.0000
6-11	7	.0077	.0075	.0122	.0095	.0061	.0890	.0002	.0122	.0195	.0000	.0086
12-17	7	.0390	.0353	.0336	.0279	.0273	.0287	.0037	.0131	.0243	0.0000	.0106
18-23	7	.0040	.0040	.0061	-.0073	.0065	-.0009	-.0082	.0108	.0106	0.0000	.0025
0- 5	8	0.0000	.0007	.0052	-.0046	.0039	.0031	-.0039	.0114	.0201	0.0000	.0049
6-11	8	.0075	.0095	.0186	.0137	.0133	.0222	.0021	.0127	.0403	.0004	.0105
12-17	8	.0619	.0581	.0576	.0556	.0602	.0668	-.0035	.0115	-.0050	.0000	.0083
18-23	8	.0029	.0029	.0053	.0028	.0071	.0157	-.0000	.0117	.0026	.0000	.0083
0- 5	9	0.0000	.0007	.0053	-.0113	.0036	-.0014	.0064	.0128	.0091	.0000	.0133
6-11	9	.0082	.0105	.0179	.0151	.0148	.0272	.0083	.0137	.0196	.0011	.0154
12-17	9	.0739	.0670	.0732	.0891	.0633	.0901	.0132	.0176	.0179	.0084	.0238
18-23	9	.0033	.0036	.0072	.0058	.0056	.0125	.0012	.0144	.0023	.0029	.0109
0- 5	10	0.0000	.0009	.0068	.0058	.0024	.0122	.0086	.0147	.0140	.0019	.0140
6-11	10	.0163	.0156	.0183	.0191	.0142	.0262	.0078	.0149	.0118	.0032	.0146
12-17	10	.0950	.0742	.0788	.0821	.0726	.0820	.0079	.0155	.0079	.0038	.0131
18-23	10	.0609	.0435	.0462	.0612	.0445	.0694	.0050	.0147	.0053	.0010	.0108
0- 5	11	.0002	.0014	.0086	.0055	.0022	.0075	.0125	.0158	.0186	.0024	.0144
6-11	11	.0150	.0132	.0179	.0181	.0131	.0238	.0106	.0152	.0094	.0055	.0137
12-17	11	.1321	.1004	.1169	.1297	.1091	.1304	.0158	.0173	.0122	.0008	.0173
18-23	11	.0217	.0164	.0187	.0268	.0210	.0381	.0000	.0120	-.0039	0.0000	.0056
0- 5	12	.0306	.0221	.0221	.0242	.0143	.0214	.0145	.0152	.0099	0.0000	.0133
6-11	12	.0036	.0037	.0109	.0108	.0021	.0099	.0188	.0170	.0180	0.0000	.0182
12-17	12	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999
18-23	12	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999

TIME	DAY	*** H2S (PPM) *** GC-FPD	COLOR	AVERAGE OX(PPM)	NO2(PPM) COLOR	SOLAR RADIATION (LANGLEYS)	**** WIND ***** DIRECT (DEG)	SPEED (MPH)	TEMP (DEG C) AMB OUT	DEW POINT	AVERAGE SO2(PPM)
0- 5	7	0.0000	9.9999	.0275	.0177	0.00	296.9	4.6	18.04	12.91	.0016
6-11	7	0.0000	9.9999	.0073	.0524	.37	239.9	3.5	18.33	11.42	.0085
12-17	7	0.0000	9.9999	.0280	.0673	.58	266.6	6.1	21.63	11.03	.0103
18-23	7	.0002	9.9999	.0028	.0577	.00	283.9	3.7	18.30	12.16	.0031
0- 5	8	.0001	9.9999	.0035	.0866	0.00	72.2	2.0	16.33	10.52	.0065
6-11	8	.0008	9.9999	.0177	.1315	.41	79.6	1.9	19.21	5.30	.0132
12-17	8	0.0000	9.9999	.0635	.0816	.63	277.8	6.4	26.34	-1.07	.0023
18-23	8	0.0000	9.9999	.0114	.1057	-.00	9.9	3.1	20.93	4.39	.0045
0- 5	9	.0023	9.9999	.0011	.1106	-.00	60.7	2.0	17.14	1.40	.0083
6-11	9	.0020	9.9999	.0190	.1419	.41	90.8	2.0	20.13	-.07	.0116
12-17	9	.0015	9.9999	.0767	.1045	.63	280.6	6.5	25.89	5.87	.0162
18-23	9	.0006	9.9999	.0091	.0792	.00	261.1	3.7	20.93	12.96	.0064
0- 5	10	.0007	9.9999	.0073	.1036	0.00	70.3	1.5	16.98	10.42	.0107
6-11	10	.0014	9.9999	.0202	.1065	.42	98.0	2.6	18.27	8.46	.0105
12-17	10	.0018	9.9999	.0772	.0573	.60	262.4	5.7	23.71	11.66	.0096
18-23	10	.0028	9.9999	.0570	.0941	.00	266.7	2.9	20.89	14.04	.0073
0- 5	11	.0026	9.9999	.0048	.0796	0.00	148.4	1.5	21.62	14.20	.0111
6-11	11	.0029	9.9999	.0184	.1010	.34	145.1	1.1	20.02	13.49	.0109
12-17	11	.0032	9.9999	.1198	.0815	.61	280.9	4.9	24.45	13.03	.0127
18-23	11	.0021	9.9999	.0296	.0852	.00	282.1	4.0	21.64	14.46	.0027
0- 5	12	.0023	9.9999	.0179	.0475	0.00	250.1	2.1	20.35	14.02	.0106
6-11	12	.0026	9.9999	.0060	.0759	.15	216.1	2.2	18.78	13.43	.0143
12-17	12	9.9999	9.9999	9.9999	9.9999	.50	281.5	6.1	21.18	13.06	9.9999
18-23	12	9.9999	9.9999	9.9999	9.9999	.00	281.1	3.8	18.62	13.13	9.9999

MOBILE VAN LOCATION = LOS ANGELES; CALIFORNIA

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TIME DAY (PCT)	************ OZONE (PPM) ************				* OXIDANT (PPM) *		****************** SO2 (PPM) ******************				
	CHEM	GAS PH	COUL	COLOR	COUL	COLOR	COLOR	FPD	COUL	COND	GC-FPD
0- 5 13	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999
6-11 13	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999
12-17 13	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999
18-23 13	.0303	.0238	.0233	.0297	.0228	.0326	9.9999	.0143	-.0046	0.0000	.0070
0- 5 14	.0131	.0120	.0116	9.9999	.0095	9.9999	9.9999	.0147	.0004	0.0000	.0076
6-11 14	.0013	.0023	.0069	9.9999	.0019	9.9999	9.9999	.0124	.0063	0.0000	.0091
12-17 14	.0389	.0319	9.9999	9.9999	.0255	9.9999	9.9999	.0085	-.0001	0.0000	.0062
18-23 14	.0070	.0040	9.9999	9.9999	.0072	9.9999	9.9999	.0049	-.0048	0.0000	.0032
0- 5 15	0.0000	.0019	9.9999	9.9999	.0029	9.9999	9.9999	.0082	.0058	0.0000	.0072
6-11 15	.0022	.0063	9.9999	9.9999	.0054	9.9999	9.9999	.0111	.0197	0.0000	.0103
12-17 15	.0690	.0585	9.9999	9.9999	.0493	9.9999	9.9999	.0107	.0089	0.0000	.0078
18-23 15	.0171	.0150	9.9999	9.9999	.0161	9.9999	9.9999	.0034	-.0020	0.0000	.0029
0- 5 16	.0251	.0229	9.9999	9.9999	.0225	9.9999	9.9999	.0020	-.0038	0.0000	.0023
6-11 16	.0079	.0083	9.9999	9.9999	.0076	9.9999	9.9999	.0110	.0186	.0009	.0093
12-17 16	.0445	.0538	.0443	.0556	.0473	.0628	9.9999	.0113	.0088	.0004	.0077
18-23 16	.0207	.0183	.0187	.0288	.0200	.0369	9.9999	.0077	-.0083	0.0000	.0033
0- 5 17	.0036	.0043	.0079	.0173	.0043	.0225	9.9999	.0140	.0117	0.0000	.0083
6-11 17	.0160	.0155	.0184	.0300	.0154	.0369	9.9999	.0139	.0117	.0011	.0078
12-17 17	.1291	.1062	.1127	.1324	.1017	.1272	9.9999	.0122	.0081	.0310	.0075
18-23 17	.0306	.0262	.0275	.0394	.0274	.0463	9.9999	.0065	.0030	.0023	.0045
0- 5 18	0.0000	.0015	.0083	.0201	.0037	.0260	9.9999	.0110	.0134	.0091	.0088
6-11 18	.0145	.0134	.0252	.0420	.0107	.0409	9.9999	.0204	.0257	.0255	.0168
12-17 18	.1480	.1141	.1353	.1576	.1063	.1360	9.9999	.0263	.0307	.0532	.0225
18-23 18	.0259	.0189	.0239	.0373	.0221	.0425	9.9999	.0065	.0060	.0039	.0065

	*** H2S (PPM) ***		AVERAGE	NO2(PPM)	SOLAR	***$ WIND *****		TEMP (DEG C)		AVERAGE
	GC-FPD	COLOR	OX(PPM)	COLOR	RADIATION (LANGLEYS)	DIRECT (DEG)	SPEED (MPH)	AMB OUT	DEW POINT	SO2(PPM)
0- 5 13	9.9999	9.9999	9.9999	9.9999	0.00	231.8	1.5	18.26	12.72	9.9999
6-11 13	9.9999	9.9999	9.9999	9.9999	.18	285.7	2.1	18.83	12.01	9.9999
12-17 13	9.9999	9.9999	9.9999	.0701	.55	279.0	7.3	20.81	11.96	9.9999
18-23 13	.0023	9.9999	.0311	.0535	.00	278.3	4.3	18.09	12.49	.0060
0- 5 14	.0027	9.9999	.0098	.0599	0.00	353.2	1.3	18.08	12.33	.0057
6-11 14	.0026	9.9999	.0019	.0698	.12	278.1	3.4	18.48	11.77	.0069
12-17 14	.0024	9.9999	.0255	9.9999	.46	281.2	7.1	20.04	10.95	.0037
18-23 14	.0012	9.9999	.0072	9.9999	.00	287.4	4.6	17.28	10.62	.0008
0- 5 15	.0025	9.9999	.0029	9.9999	0.00	55.1	1.5	15.49	9.99	.0053
6-11 15	.0028	9.9999	.0054	9.9999	.15	65.0	2.1	16.31	10.19	.0103
12-17 15	.0026	9.9999	.0493	9.9999	.55	277.7	5.9	20.36	10.97	.0069
18-23 15	.0017	9.9999	.0161	9.9999	0.00	298.3	4.4	17.94	12.07	.0011
0- 5 16	.0015	9.9999	.0225	9.9999	0.00	289.7	2.2	18.57	12.34	.0002
6-11 16	.0021	9.9999	.0076	9.9999	.23	164.2	1.9	17.39	12.19	.0100
12-17 16	.0025	9.9999	.0548	.0706	.57	286.8	6.6	20.67	12.51	.0071
18-23 16	.0020	9.9999	.0284	.0654	.00	282.8	3.6	18.16	12.66	.0027
0- 5 17	.0024	9.9999	.0134	.0828	0.00	149.1	1.0	17.63	12.52	.0085
6-11 17	.0021	9.9999	.0262	.0943	.26	234.8	2.0	17.57	12.42	.0086
12-17 17	.0026	9.9999	.1147	.0610	.56	280.2	5.6	21.44	12.17	.0147
18-23 17	.0020	9.9999	.0368	.0664	.00	270.0	4.1	19.28	12.90	.0041
0- 5 18	.0024	9.9999	.0149	.0999	0.00	168.0	.6	18.30	12.79	.0106
6-11 18	.0031	9.9999	.0259	.1276	.26	175.6	1.5	17.54	12.18	.0221
12-17 18	.0036	9.9999	.1211	.0698	.46	267.4	4.9	21.40	12.32	.0332
18-23 18	.0020	9.9999	.0323	.0661	0.00	286.0	3.5	18.44	12.70	.0057

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MOBILE VAN LOCATION = LOS ANGELES; CALIFORNIA

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TIME DAY (PCT)	************ OZONE (PPM) ************ CHEM	GAS PH	COUL	COLOR	* OXIDANT (PPM) * COUL	COLOR	****************** SO2 (PPM) ****************** COLOR	FPD	COUL	COND	GC-FPD
0- 5 19	.0211	.0153	.0225	.0303	.0109	.0239	9.9999	.0145	.0180	.0141	.0122
6-11 19	.0123	.0107	.0119	.0230	.0103	.0357	9.9999	.0114	.0174	.0154	.0110
12-17 19	.0623	.0466	.0355	.0486	.0457	.0689	.0016	.0139	.0118	.0167	.0095
18-23 19	.0341	.0232	.0285	.0425	.0274	.0489	-.0013	.0119	.0052	.0048	.0070
0- 5 20	.0154	.0109	.0148	.0261	.0109	.0291	.0029	.0120	.0092	.0072	.0081
6-11 20	.0118	.0086	.0119	.0209	.0086	.0243	.0025	.0076	.0085	.0079	.0089
12-17 20	.0316	.0216	.0253	.0341	.0243	.0394	.0006	.0048	.0055	.0061	.0062
18-23 20	.0034	.0029	.0025	.0123	.0056	.0223	-.0016	-.0013	.0019	.0003	.0039
0- 5 21	0.0000	.0004	.0038	.0086	.0010	.0131	.0036	.0045	.0123	.0057	.0079
6-11 21	.0008	.0012	.0187	.0219	.0010	.0116	.0208	.0165	.0316	.0260	.0226
12-17 21	.0128	.0100	.0112	9.9999	.0071	9.9999	.0069	.0032	.0104	.0107	.0099
18-23 21	.0042	.0030	.0012	9.9999	.0038	9.9999	.0021	-.0050	.0017	.0003	.0044
0- 5 22	0.0000	-.0000	.0040	9.9999	.0007	9.9999	.0061	-.0038	.0085	.0036	.0201
6-11 22	.0035	.0035	.0129	9.9999	.0023	9.9999	.0167	.0058	.0221	.0172	.0155
12-17 22	.0207	.0213	.0197	9.9999	.0182	9.9999	.0114	-.0025	.0091	.0092	.0075
18-23 22	.0017	.0014	.0009	9.9999	.0029	9.9999	9.9999	-.0070	.0077	.0023	.0052
0- 5 23	0.0000	-.0003	.0045	9.9999	.0008	9.9999	9.9999	-.0068	.0118	.0066	.0220
6-11 23	.0037	.0027	.0036	9.9999	.0028	9.9999	9.9999	.0001	.0155	.0125	.0116
12-17 23	.0130	.0121	9.9999	9.9999	.0117	.0265	9.9999	.0045	.0115	.0088	.0116
18-23 23	.0034	.0025	9.9999	9.9999	.0045	.0173	9.9999	-.0050	.0013	.0001	.0027
0- 5 24	.0006	.0004	9.9999	9.9999	.0019	.0132	9.9999	-.0063	.0058	.0010	.0038
6-11 24	.0036	.0039	9.9999	9.9999	.0020	.0139	9.9999	.0057	.0178	.0129	.0163
12-17 24	.0315	.0287	9.9999	9.9999	.0252	.0432	9.9999	-.0047	.0073	.0028	.0094
18-23 24	.0040	.0040	9.9999	9.9999	.0058	.0220	9.9999	-.0077	.0054	.0003	.0048

	*** H2S (PPM) *** GC-FPD	COLOR	AVERAGE OX(PPM)	NO2(PPM) COLOR	SOLAR RADIATION (LANGLEYS)	***# WIND ***** DIRECT (DEG)	SPEED (MPH)	TEMP (DEG C) AMB OUT	DEW POINT	AVERAGE SO2(PPM)
0- 5 19	.0021	9.9999	.0174	.0502	0.00	181.7	1.7	17.73	12.61	.0147
6-11 19	.0019	9.9999	.0230	.1055	.27	181.4	1.9	18.29	11.95	.0138
12-17 19	.0030	9.9999	.0573	.0801	.53	275.5	6.8	20.87	12.21	.0107
18-23 19	.0028	9.9999	.0381	.0722	0.00	288.1	4.0	18.19	12.44	.0055
0- 5 20	.0031	9.9999	.0199	.0654	0.00	143.6	1.4	17.68	11.93	.0079
6-11 20	.0032	9.9999	.0165	.0637	.23	149.9	4.1	18.50	11.02	.0071
12-17 20	.0023	9.9999	.0319	.0603	.44	279.5	8.0	19.50	11.48	.0046
18-23 20	.0024	9.9999	.0140	.0642	0.00	274.0	3.7	17.07	10.98	.0007
0- 5 21	.0023	9.9999	.0071	.0682	0.00	184.7	1.3	16.08	10.41	.0068
6-11 21	.0036	9.9999	.0038	.0967	.18	108.0	1.9	17.29	11.74	.0235
12-17 21	.0029	9.9999	.0071	.0611	.42	282.6	7.9	18.67	10.65	.0082
18-23 21	.0024	9.9999	.0038	.0544	0.00	263.3	4.9	16.65	10.97	.0007
0- 5 22	.0029	9.9999	.0007	.0594	0.00	132.7	1.6	16.78	10.82	.0069
6-11 22	.0034	9.9999	.0023	.0823	.27	125.9	2.2	16.69	10.42	.0154
12-17 22	.0007	9.9999	.0182	.0758	.41	275.8	7.4	18.50	8.10	.0061
18-23 22	.0008	9.9999	.0029	.0675	0.00	33.4	3.1	16.88	11.12	.0021
0- 5 23	.0016	9.9999	.0008	.0765	0.00	60.0	3.3	14.82	9.08	.0084
6-11 23	.0024	9.9999	.0028	.0778	.20	83.7	2.9	16.68	9.16	.0099
12-17 23	.0024	9.9999	.0192	9.9999	.31	259.4	7.3	19.23	12.17	.0091
18-23 23	.0009	.0006	.0109	9.9999	0.00	287.4	5.5	18.16	12.73	-.0002
0- 5 24	.0014	.0004	.0076	9.9999	0.00	192.3	1.1	18.75	12.34	.0011
6-11 24	.0025	.0002	.0079	9.9999	.23	171.7	1.9	17.52	11.86	.0131
12-17 24	.0022	.0004	.0342	9.9999	.36	269.2	5.8	19.32	10.80	.0037
18-23 24	.0019	.0007	.0139	9.9999	.00	279.5	3.2	17.20	11.21	.0007

MOBILE VAN LOCATION = LOS ANGELES; CALIFORNIA OCT 1970

TIME DAY (PCT)	************ OZONE (PPM) ************ CHEM	GAS PH	COUL	COLOR	* OXIDANT (PPM) * COUL	COLOR	****************** SO2 (PPM) ****************** COLOR	FPD	COUL	COND	GC-FPD
0- 5 25	0.0000	-.0003	9.9999	9.9999	.0012	.0167	9.9999	-.0074	.0144	.0025	.0099
6-11 25	.0087	.0089	9.9999	9.9999	.0049	.0190	9.9999	-.0071	.0127	.0079	.0281
12-17 25	.0542	.0503	9.9999	9.9999	.0434	.0543	9.9999	-.0061	.0087	.0058	.0116
18-23 25	.0053	.0049	9.9999	9.9999	.0068	.0274	9.9999	-.0015	.0137	.0061	.0085
0- 5 26	0.0000	-.0002	9.9999	9.9999	.0018	.0213	9.9999	-.0012	.0179	.0091	.0285
6-11 26	.0047	.0061	9.9999	9.9999	.0068	.0324	9.9999	.0043	.0217	.0147	.0168
12-17 26	.0260	.0286	9.9999	9.9999	.0272	.0480	.0017	-.0031	.0077	.0076	.0061
18-23 26	0.0000	.0002	9.9999	9.9999	.0023	.0243	.0073	.0033	.0219	.0111	.0101
0- 5 27	-.0001	-.0000	9.9999	9.9999	.0017	.0265	.0134	.0101	.0242	.0180	.0143
6-11 27	.0046	.0057	9.9999	9.9999	.0055	.0387	.0244	.0181	.0415	.0344	.0257
12-17 27	.0323	.0338	9.9999	9.9999	.0250	.0455	.0181	.0114	.0225	.0188	.0211
18-23 27	0.0000	.0004	.0124	.0079	.0011	.0837	.0149	.0055	.0289	.0123	.0155
0- 5 28	0.0000	-.0001	.0145	.0091	.0003	.0823	.0209	.0088	.0265	.0166	.0190
6-11 28	.0011	.0025	.0159	.0138	.0036	.0111	.0209	.0079	.0245	.0183	.0182
12-17 28	.0205	.0203	.0286	9.9999	.0248	9.9999	.0144	-.0006	.0158	.0107	.0117
18-23 28	0.0000	.0006	.0153	.0212	.0031	.0193	.0236	.0045	.0308	.0123	.0190
0- 5 29	0.0000	.0001	.0105	.0092	.0005	.0054	.0215	.0034	.0195	.0077	.0160
6-11 29	.0040	.0064	.0183	.0209	.0065	.0175	.0230	.0054	.0245	.0134	.0228
12-17 29	.0126	.0167	.0306	.0559	.0233	.0651	.0233	.0060	.0289	.0166	9.9999
18-23 29	.0001	.0005	.0300	.0581	.0072	.0546	.0392	.0161	.0490	.0313	9.9999
0- 5 30	.0003	-.0001	.0312	.0535	.0049	.0453	.0443	.0176	.0499	.0352	9.9999
6-11 30	.0059	.0085	.0356	.0568	.0122	.0530	.0410	.0171	.0467	.0355	9.9999
12-17 30	.0481	.0481	.0665	.0867	.0349	.0711	.0551	.0323	.0494	.0445	.0226
18-23 30	.0001	.0002	.0115	.0352	.0040	.0384	.0303	.0051	.0220	.0106	-.0001

	*** H2S (PPM) *** GC-FPD	COLOR	AVERAGE OX(PPM)	NO2(PPM) COLOR	SOLAR RADIATION (LANGLEYS)	***# WIND ***** DIRECT (DEG)	SPEED (MPH)	TEMP (DEG C) AMB OUT	DEW POINT	AVERAGE SO2(PPM)
0- 5 25	.0023	.0007	.0089	9.9999	0.00	47.2	2.1	15.32	10.12	.0049
6-11 25	.0020	.0006	.0120	9.9999	.33	111.8	1.4	15.56	9.07	.0104
12-17 25	.0028	.0004	.0489	9.9999	.55	264.8	6.9	19.52	7.33	.0045
18-23 25	.0022	.0003	.0171	9.9999	-.01	97.0	1.9	15.75	6.25	.0067
0- 5 26	.0024	.0003	.0115	9.9999	0.00	50.8	1.8	12.07	4.76	.0136
6-11 26	.0027	.0004	.0196	9.9999	.36	101.0	2.3	14.15	4.98	.0159
12-17 26	.0027	.0020	.0376	9.9999	.54	272.8	5.9	20.33	4.80	.0040
18-23 26	.0027	.0035	.0133	9.9999	-.00	266.3	2.2	16.25	6.98	.0108
0- 5 27	.0031	.0048	.0141	9.9999	0.00	49.5	3.4	13.81	3.61	.0160
6-11 27	.0036	.0055	.0221	9.9999	.35	97.5	2.5	16.36	-6.48	.0288
12-17 27	.0030	.0060	.0353	9.9999	.54	286.3	8.2	24.12	-5.57	.0184
18-23 27	.0033	.0066	.0024	.0678	-.01	304.2	2.4	19.35	-9.11	.0154
0- 5 28	.0030	.0078	.0013	.0701	-.01	54.1	2.5	13.83	-8.75	.0184
6-11 28	.0035	.0083	.0074	.0912	.39	73.9	2.5	16.13	-7.88	.0178
12-17 28	.0033	.0081	.0308	.1179	.44	227.4	1.4	26.56	-3.06	.0104
18-23 28	.0023	.0082	.0112	.0977	-.01	74.6	2.8	20.00	-7.92	.0180
0- 5 29	.0019	.0092	.0029	.0593	-.00	53.7	3.8	19.40	-9.86	.0136
6-11 29	.0019	.0099	.0120	.0801	.47	79.0	2.8	21.77	-6.31	.0166
12-17 29	9.9999	.0102	.0442	.1566	.35	291.0	4.1	26.60	-2.44	.0167
18-23 29	9.9999	.0122	.0309	.1845	-.01	137.5	.7	18.33	.92	.0339
0- 5 30	9.9999	.0128	.0251	.1735	0.00	53.1	.9	14.71	.02	.0367
6-11 30	9.9999	.0132	.0326	.1879	.44	155.5	1.2	20.34	-2.85	.0347
12-17 30	.0087	.0140	.0530	.1528	.32	285.0	6.3	21.61	5.36	.0408
18-23 30	.0049	.0142	.0212	.1013	0.00	91.9	2.2	16.84	4.36	.0136

MOBILE VAN LOCATION = LOS ANGELES, CALIFORNIA

OCT 1970

TIME DAY (PCT)	OZONE (PPM) CHEM	OZONE (PPM) GAS PH	OZONE (PPM) COUL	OZONE (PPM) COLOR	OXIDANT (PPM) COUL	OXIDANT (PPM) COLOR	SO2 (PPM) COLOR	SO2 (PPM) FPD	SO2 (PPM) COUL	SO2 (PPM) COND	SO2 (PPM) GC-FPD
0- 5 31	.0001	.0001	.0135	.0356	.0026	.0347	.0334	.0051	.0260	.0122	.0058
6-11 31	.0180	.0223	.0389	.0693	.0255	.0710	.0388	.0086	.0263	.0249	.0110
12-17 31	.0847	.0291	.0828	.1155	.0703	.1132	.0372	.0086	.0212	.0267	-.0022
18-23 31	0.0000	.0004	.0093	.0299	.0028	.0329	.0327	.0004	.0236	.0066	-.0042

	H2S (PPM) GC-FPD	H2S (PPM) COLOR	AVERAGE OX(PPM)	NO2(PPM) COLOR	SOLAR RADIATION (LANGLEYS)	WIND DIRECT (DEG)	WIND SPEED (MPH)	TEMP (DEG C) AMB OUT	TEMP (DEG C) DEW POINT	AVERAGE SO2(PPM)
0- 5 31	.0053	.0147	.0187	.0947	0.00	17.3	2.4	13.84	2.83	.0165
6-11 31	.0061	.0159	.0483	.1439	.48	21.7	1.8	17.98	-.25	.0219
12-17 31	.0058	.0153	.0917	.0966	.40	293.0	5.2	22.08	5.30	.0183
18-23 31	.0064	.0149	.0178	.0895	0.00	195.5	1.4	18.47	11.23	.0118

MOBILE VAN LOCATION = LOS ANGELES; CALIFORNIA NOV 1970

TIME (PCT)	DAY	************ OZONE (PPM) ************ CHEM	GAS PH	COUL	COLOR	* OXIDANT (PPM) * COUL	COLOR	****************** SO2 (PPM) ****************** COLOR	FPD	COUL	COND	GC-FPD
0- 5	1	0.0000	.0001	.0239	.0588	.0070	.0609	.0462	.0084	.0435	.0283	.0122
6-11	1	.0527	.0510	.0705	.1038	.0482	.0963	.0505	.0130	.0389	.0364	.0190
12-17	1	.1150	.1041	.1127	.1396	.0934	.1333	.0483	.0152	.0291	.0342	.0062
18-23	1	.0008	.0009	.0156	.0221	.0038	.0203	.0471	.0058	.0217	.0107	.0021
0- 5	2	0.0000	.0002	.0170	.0204	.0013	.0155	.0528	.0090	.0249	.0143	.0078
6-11	2	.0107	.0134	.0225	.0294	.0123	.0225	.0593	.0188	.0424	.0286	.0174
12-17	2	.0467	.0459	9.9999	9.9999	.0362	9.9999	9.9999	.0191	.0348	.0356	.0135
18-23	2	.0001	.0003	9.9999	9.9999	.0049	9.9999	9.9999	.0025	.0112	.0045	-.0087
0- 5	3	0.0000	.0001	9.9999	9.9999	.0026	9.9999	9.9999	.0097	.0241	.0187	.0033
6-11	3	.0007	.0016	9.9999	9.9999	.0062	9.9999	9.9999	.0207	.0422	.0376	.0162
12-17	3	.0233	.0202	.0214	.0386	.0208	.0477	9.9999	.0120	.0264	.0186	.0079
18-23	3	0.0000	.0004	.0013	.0188	.0039	.0290	9.9999	.0005	.0117	.0014	-.0068
0- 5	4	.0032	.0024	.0092	.0236	.0009	.0211	9.9999	.0078	.0216	.0119	.0054
6-11	4	.0013	.0020	.0214	.0366	.0007	.0283	9.9999	.0164	.0380	.0280	.0190
12-17	4	.0222	.0229	.0268	.0462	.0114	.0444	.0177	.0142	.0250	.0195	.0188
18-23	4	.0002	.0004	.0026	.0167	.0013	.0196	.0016	.0021	.0100	.0003	.0043
0- 5	5	0.0000	-.0000	.0030	.0171	.0008	.0197	.0035	.0025	.0106	.0024	.0054
6-11	5	.0032	.0053	.0174	.0382	.0032	.0346	.0204	.0110	.0300	.0223	.0126
12-17	5	.0065	.0073	.0214	.0318	.0025	.0211	.0259	.0153	.0313	.0219	.0225
18-23	5	0.0000	.0003	.0002	.0032	.0006	.0862	.0019	-.0004	-.0013	0.0000	.0049
0- 5	6	.0004	.0003	.0067	.0054	.0002	.0011	.0123	.0052	.0083	.0050	.0082
6-11	6	.0018	.0024	.0036	.0054	.0011	.0058	.0071	.0018	.0027	.0015	.0071
12-17	6	.0053	.0070	.0051	.0129	.0065	.0175	.0028	-.0013	-.0040	0.0000	.0052
18-23	6	0.0000	.0001	.0010	.0113	.0014	.0149	.0018	-.0019	.0020	.0004	.0045

		*** H2S (PPM) *** GC-FPD	COLOR	AVERAGE OX(PPM)	NO2(PPM) COLOR	SOLAR RADIATION (LANGLEYS)	**** WIND ***** DIRECT (DEG)	SPEED (MPH)	TEMP (DEG C) AMB OUT	DEW POINT	AVERAGE SO2(PPM)
0- 5	1	.0069	.0169	.0340	.1809	0.00	82.2	.8	13.00	5.43	.0277
6-11	1	.0067	.0181	.0723	.1414	.46	124.3	.8	18.80	1.77	.0308
12-17	1	.0071	.0177	.1134	.1230	.37	289.3	5.2	22.71	10.10	.0266
18-23	1	.0060	.0169	.0121	.0949	0.00	215.7	1.8	21.09	11.80	.0175
0- 5	2	.0055	.0178	.0084	.1022	0.00	102.5	1.3	29.72	11.81	.0217
6-11	2	.0053	.0182	.0174	.1285	.36	264.8	3.1	22.65	11.29	.0307
12-17	2	.0024	9.9999	.0362	9.9999	.36	288.8	5.5	21.57	11.67	.0257
18-23	2	-.0021	9.9999	.0049	9.9999	0.00	241.5	2.4	26.87	11.56	.0024
0- 5	3	-.0028	9.9999	.0026	9.9999	0.00	125.5	1.1	30.48	11.66	.0139
6-11	3	.0046	9.9999	.0062	9.9999	.38	240.2	3.8	20.23	10.81	.0292
12-17	3	.0040	9.9999	.0342	.0918	.31	292.0	5.8	18.61	10.60	.0162
18-23	3	-.0011	9.9999	.0165	.0722	0.00	281.8	2.3	20.21	10.57	.0017
0- 5	4	-.0024	9.9999	.0110	.0558	0.00	217.6	2.1	18.38	10.41	.0116
6-11	4	.0006	9.9999	.0145	.0933	.19	206.7	1.5	17.06	10.41	.0253
12-17	4	.0069	9.9999	.0279	.0927	.25	279.3	5.3	18.46	10.25	.0191
18-23	4	.0048	9.9999	.0105	.0400	0.00	250.6	1.9	17.27	10.41	.0037
0- 5	5	.0041	9.9999	.0103	.0455	0.00	206.6	1.1	17.33	10.63	.0049
6-11	5	.0044	9.9999	.0189	.1012	.32	139.3	2.6	18.39	10.68	.0203
12-17	5	.0068	.0041	.0118	.0787	.11	231.8	3.6	23.03	13.56	.0236
18-23	5	.0042	.0047	.0034	.0245	0.00	292.1	3.6	26.28	10.54	.0010
0- 5	6	.0040	.0060	.0006	.0211	0.00	216.2	3.6	35.33	10.87	.0078
6-11	6	.0047	.0076	.0035	.0271	.18	243.9	6.3	40.48	10.97	.0040
12-17	6	.0053	.0088	.0120	.0298	.29	289.7	6.2	19.60	11.78	.0003
18-23	6	.0042	.0090	.0082	.0305	0.00	288.7	3.7	22.02	11.41	.0014

MOBILE VAN LOCATION = LOS ANGELES; CALIFORNIA

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TIME (PCT)	DAY	************ OZONE (PPM) ************ CHEM	GAS PH	COUL	COLOR	* OXIDANT (PPM) * COUL	COLOB	****************** SO2 (PPM) ****************** COLOR	FPD	COUL	COND	GC-FPD
0- 5	7	.0001	-.0000	-.0012	.0093	.0012	.0143	.0013	-.0023	-.0078	0.0000	.0042
6-11	7	.0042	.0069	.0060	.0179	.0082	.0251	.0033	-.0013	-.0040	.0006	.0050
12-17	7	.0188	.0182	.0138	.0263	.0176	.0332	.0036	-.0018	-.0113	0.0000	-.0005
18-23	7	0.0000	.0000	.0012	.0149	.0012	.0194	.0059	-.0001	.0021	.0003	.0047
0- 5	8	0.0000	-.0001	.0017	.0155	.0006	.0193	.0071	.0009	.0031	.0009	.0072
6-11	8	.0141	.0144	.0132	.0273	.0131	.0321	.0070	.0019	-.0044	.0026	.0076
12-17	8	.0302	.0310	.0277	.0535	.0348	.0693	.0008	.0015	-.0100	.0009	-.0037
18-23	8	0.0000	.0001	.0064	.0332	.0047	.0421	.0109	.0038	.0088	.0068	.0089
0- 5	9	0.0000	-.0002	.0020	.0222	.0014	.0276	.0077	.0019	-.0010	.0032	.0085
6-11	9	.0074	.0092	.0126	.0334	.0099	.0388	.0097	.0040	.0038	.0076	.0116
12-17	9	.0262	.0307	.0296	.0596	.0325	.0713	.0080	.0027	-.0070	.0068	.0006
18-23	9	0.0000	.0001	.0045	.0267	.0013	.0306	.0116	.0037	.0058	.0047	.0100
0- 5	10	.0001	-.0002	.0050	.0277	.0012	.0318	.0129	.0047	.0033	.0058	.0146
6-11	10	.0096	.0127	.0312	.0626	.0192	.0785	.0211	.0106	.0158	.0237	.0264
12-17	10	9.9999	.0287	.0373	9.9999	.0197	9.9999	.0276	.0206	.0170	.0261	.0367
18-23	10	9.9999	.0002	.0000	9.9999	.0028	9.9999	.0040	.0030	-.0130	.0026	.0112
0- 5	11	9.9999	-.0002	.0047	9.9999	.0036	9.9999	.0096	.0055	-.0011	.0107	.0146
6-11	11	9.9999	.0062	.0202	9.9999	.0078	9.9999	.0187	.0167	.0142	.0271	.0328
12-17	11	.0069	.0336	.0426	9.9999	.0230	9.9999	.0255	.0222	.0133	.0321	.0394
18-23	11	.0013	.0007	.0037	9.9999	.0021	9.9999	.0111	.0061	-.0130	.0062	.0168
0- 5	12	.0004	-.0002	.0206	9.9999	.0004	9.9999	.0286	.0213	.0084	.0273	.0389
6-11	12	.0049	.0066	.0183	9.9999	.0038	9.9999	.0243	.0156	.0016	.0258	.0337
12-17	12	.0089	.0108	.0157	-.0000	.0112	.0030	.0126	.0032	-.0179	.0193	.0125
18-23	12	.0002	-.0003	.0077	-.0020	.0023	.0822	.0204	.0062	-.0061	.0136	.0203

		*** H2S (PPM) *** GC-FPD	COLOR	AVERAGE OX(PPM)	NO2(PPM) COLOR	SOLAR RADIATION (LANGLEYS)	***6 WIND ***** DIRECT (DEG)	SPEED (MPH)	TEMP (DEG C) AMB OUT	DEW POINT	AVERAGE SO2(PPM)
0- 5	7	.0037	.0105	.0078	.0252	0.00	246.8	2.1	20.40	11.00	-.0009
6-11	7	.0042	.0121	.0167	.0485	.42	193.9	2.2	19.14	10.41	.0007
12-17	7	.0048	.0164	.0254	.0301	.38	283.4	8.3	19.41	8.36	-.0020
18-23	7	.0053	.0188	.0103	.0426	0.00	29.8	2.7	16.58	8.01	.0026
0- 5	8	.0047	.0212	.0100	.0466	0.00	51.1	2.5	13.99	7.04	.0038
6-11	8	.0046	.0236	.0227	.0470	.48	68.9	3.0	17.68	5.40	.0029
12-17	8	.0063	.0259	.0520	.0830	.38	272.8	3.5	23.04	5.65	-.0021
18-23	8	.0064	.0279	.0234	.1013	0.00	72.8	1.0	17.49	7.16	.0078
0- 5	9	.0051	.0301	.0145	.0573	0.00	61.0	2.2	15.65	3.38	.0041
6-11	9	.0063	.0325	.0243	.0769	.43	95.6	2.1	20.63	1.49	.0073
12-17	9	.0091	.0351	.0519	.0847	.33	293.7	6.0	23.00	5.02	.0022
18-23	9	.0069	.0369	.0160	.0669	0.00	131.2	1.9	18.27	10.32	.0072
0- 5	10	.0058	.0388	.0165	.0748	0.00	87.6	1.5	22.29	9.54	.0083
6-11	10	.0065	.0412	.0488	.1326	.40	131.1	1.9	19.74	7.44	.0195
12-17	10	.0093	.0446	.0197	.1330	.31	291.3	5.9	20.80	10.83	.0256
18-23	10	.0071	.0476	.0028	.0718	0.00	267.6	2.6	24.60	12.37	.0016
0- 5	11	.0066	.0494	.0036	.1120	0.00	184.1	.5	21.74	11.01	.0078
6-11	11	.0070	.0518	.0078	.1589	.29	177.0	2.1	20.33	11.41	.0219
12-17	11	.0087	.0543	.0230	.1153	.30	280.2	5.2	19.01	11.41	.0265
18-23	11	.0068	.0562	.0021	.0642	0.00	255.2	2.4	19.83	11.92	.0055
0- 5	12	.0067	.0580	.0004	.0782	0.00	175.6	2.0	17.53	11.22	.0249
6-11	12	.0078	.0597	.0038	.0917	.32	189.3	3.9	17.73	10.77	.0200
12-17	12	.0098	.0615	.0105	.0704	.32	210.7	8.8	21.08	6.69	.0087
18-23	12	.0083	.0633	.0022	.0915	0.00	122.7	2.0	17.81	10.66	.0109

MOBILE VAN LOCATION = LOS ANGELES, CALIFORNIA

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TIME DAY (RCT)	************ OZONE (PPM) ************				* OXIDANT (PPM) *		****************** SO2 (PPM) ******************				
	CHEM	GAS PH	COUL	COLOR	COUL	COLOR	COLOR	FPD	COUL	COND	GC-FPD
0- 5 13	.0002	-.0005	.0107	-.0020	.0005	-.0835	.0270	.0080	-.0035	.0173	.0275
6-11 13	.0103	.0051	.0313	.0223	.0061	.0114	.0374	.0186	.0239	.0402	.0464
12-17 13	.0219	.0253	9.9999	9.9999	.0229	9.9999	9.9999	.0137	.0050	.0264	.0374
18-23 13	.0001	-.0002	9.9999	9.9999	.0025	9.9999	9.9999	.0202	.0466	.0377	.0536
0- 5 14	.0003	-.0005	9.9999	9.9999	.0019	9.9999	9.9999	.0188	.0364	.0370	.0503
6-11 14	.0030	.0036	9.9999	9.9999	.0050	9.9999	9.9999	.0147	.0183	.0288	.0407
12-17 14	.0063	.0057	-.0018	.0139	.0077	.0289	9.9999	-.0027	-.0289	0.0000	.0054
18-23 14	.0001	-.0001	.0027	.0111	.0010	.0167	9.9999	.0019	-.0038	.0057	.0196
0- 5 15	.0001	-.0006	-.0037	.0049	.0006	.0145	9.9999	-.0031	-.0175	.0009	.0142
6-11 15	.0118	.0107	.0036	.0134	.0102	.0247	9.9999	-.0036	-.0257	.0008	.0131
12-17 15	.0254	.0221	.0150	.0314	.0235	.0456	9.9999	-.0029	-.0279	.0006	.0089
18-23 15	.0002	-.0001	9.9999	9.9999	.0036	.0377	9.9999	.0034	.0017	.0114	.0231
0- 5 16	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999
6-11 16	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999
12-17 16	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999
18-23 16	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999
0- 5 17	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999
0-11 17	.0018	.0041	9.9999	9.9999	.0230	9.9999	9.9999	.0106	.0235	.0264	.0405
12-17 17	.0223	.0258	.0392	.0871	.0336	.1035	9.9999	.0082	.0113	.0215	.0301
18-23 17	.0007	.0002	.0020	.0244	.0034	.0407	9.9999	.0002	-.0030	.0037	.0245
0- 5 18	.0004	-.0005	.0100	.0385	.0032	.0520	9.9999	.0085	.0142	.0210	.0297
6-11 18	.0050	.0054	.0169	.0469	.0064	.0572	9.9999	.0107	.0309	.0276	.0327
12-17 18	.0320	.0292	.0434	.0743	.0195	.0666	.0380	.0393	.0367	.0409	.0232
18-23 18	.0004	-.0005	.0032	.0163	.0042	.0276	.0073	.0073	-.0093	.0060	.0128

	*** H2S (PPM) ***		AVERAGE	NO2(PPM)	SOLAR RADIATION (LANGLEYS)	***# WIND *****	
	GC-FPD	COLOR	OX(PPM)	COLOR		DIRECT (DEG)	SPEED (MPH)
0- 5 13	.0073	.0647	-.0015	.0831	0.00	70.5	3.0
6-11 13	.0084	.0664	.0087	.1354	.44	217.9	2.9
12-17 13	.0106	9.9999	.0226	9.9999	.33	253.2	4.1
18-23 13	.0095	9.9999	.0025	9.9999	0.00	81.1	1.3
0- 5 14	.0081	9.9999	.0019	9.9999	0.00	54.2	1.6
6-11 14	.0076	9.9999	.0050	9.9999	.37	83.0	2.7
12-17 14	.0078	9.9999	.0183	.0523	.29	133.2	6.1
18-23 14	.0075	9.9999	.0088	.0693	0.00	53.6	2.1
0- 5 15	.0063	9.9999	.0076	.0499	0.00	49.5	3.9
6-11 15	.0061	9.9999	.0174	.0450	.44	64.1	4.3
12-17 15	.0071	9.9999	.0345	.0539	.32	139.7	3.1
18-23 15	.0084	9.9999	.0206	9.9999	-.00	92.7	1.0
0- 5 16	9.9999	9.9999	9.9999	9.9999	99.99	999.9	999.9
6-11 16	9.9999	9.9999	9.9999	9.9999	99.99	999.9	999.9
12-17 16	9.9999	9.9999	9.9999	9.9999	99.99	999.9	999.9
18-23 16	9.9999	9.9999	9.9999	9.9999	99.99	999.9	999.9
0- 5 17	9.9999	9.9999	9.9999	9.9999	99.99	999.9	999.9
0-11 17	.0092	9.9999	.0410	9.9999	.56	191.5	1.0
12-17 17	.0071	9.9999	.0686	.2100	.29	298.2	3.8
18-23 17	.0016	9.9999	.0221	.1319	0.00	229.9	1.2
0- 5 18	.0029	9.9999	.0276	.1928	0.00	60.9	1.1
6-11 18	.0075	9.9999	.0318	.2211	.35	167.1	2.1
12-17 18	.0014	9.9999	.0430	.1563	.27	269.2	4.4
18-23 18	-.0064	9.9999	.0159	.0976	0.00	140.4	1.8

TEMP (DEG C)		AVERAGE
AMB OUT	DEW POINT	SO2(PPM)
13.95	6.51	.0152
18.73	1.27	.0333
24.88	-4.21	.0208
19.87	-2.38	.0395
15.70	-1.19	.0356
19.10	-2.18	.0256
25.20	-5.43	-.0065
19.65	-4.95	.0058
15.76	-5.43	-.0014
19.17	-5.78	-.0039
25.07	-3.90	-.0053
19.66	-4.40	.0099
999.99	999.99	9.9999
999.99	999.99	9.9999
999.99	999.99	9.9999
999.99	999.99	9.9999
999.99	999.99	9.9999
999.99	999.99	9.9999
21.37	-1.82	.0252
21.85	5.40	.0182
18.78	18.32	.0063
12.73	5.21	.0183
14.09	6.87	.0255
18.79	18.10	.0386
26.24	18.85	.0048

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MOBILE VAN LOCATION = LOS ANGELES; CALIFORNIA NOV 1970

TIME DAY (RCT)	************ OZONE (PPM) ************				* OXIDANT (PPM) *		***************** SO2 (PPM) *****************				
	CHEM	GAS PH	COUL	COLOR	COUL	COLOR	COLOR	FPD	COUL	COND	GC-FPD
0- 5 19	.0006	-.0006	.0019	.0098	.0029	.0189	.0056	.0053	-.0097	.0047	.0131
6-11 19	.0064	.0078	.0146	.0366	.0120	.0457	.0115	.0094	-.0013	.0120	.0146
12-17 19	.0314	.0320	.0444	.0414	.0373	.0508	.0141	.0127	.0020	.0415	.0128
18-23 19	.0030	.0018	.0152	-.0072	.0028	-.0123	.0199	.0161	.0003	.0295	.0172
0- 5 20	.0003	-.0006	.0054	-.0052	.0029	-.0007	.0083	.0067	-.0122	.0213	.0117
6-11 20	.0091	.0106	.0174	.0055	.0134	.0130	.0095	.0083	-.0062	.0253	.0134
12-17 20	.0312	.0312	.0346	.0404	.0296	.0456	.0109	.0088	-.0052	.0272	.0129
18-23 20	.0006	-.0001	.0058	.0092	.0065	.0210	.0045	.0019	-.0060	.0188	.0093
0- 5 21	.0003	-.0007	.0098	.0094	.0032	.0132	.0111	.0074	.0052	.0269	.0119
6-11 21	.0072	.0073	.0117	.0114	.0075	.0157	.0081	.0058	-.0051	.0254	.0108
12-17 21	.0364	.0356	.0340	.0324	.0345	.0382	.0036	.0020	-.0174	.0188	.0059
18-23 21	.0003	-.0005	.0011	.0004	.0042	.0892	.0002	-.0043	-.0134	.0116	.0072
0- 5 22	.0002	-.0008	.0055	.0029	.0025	.0863	.0047	-.0008	-.0010	.0203	.0098
6-11 22	.0140	.0146	.0192	.0137	.0181	.0196	.0036	-.0011	-.0082	.0220	.0090
12-17 22	.0448	.0424	.0405	.0343	.0456	.0427	-.0004	-.0045	-.0199	.0113	-.0024
18-23 22	.0003	-.0007	.0077	.0078	.0039	.0128	.0061	.0015	.0071	.0214	.0081
0- 5 23	.0003	-.0008	.0085	.0091	.0027	.0109	.0073	.0028	.0049	.0251	.0098
6-11 23	.0094	.0106	.0263	.0296	.0160	.0321	.0115	.0074	.0175	.0398	.0119
12-17 23	.0270	.0288	.0370	.0462	.0374	.0577	.0017	.0020	.0038	.0258	-.0034
18-23 23	.0003	-.0005	.0137	.0200	.0063	.0252	.0127	.0076	9.9999	.0304	.0064
0- 5 24	.0003	-.0008	.0198	.0291	.0072	.0325	.0205	.0129	9.9999	.0416	.0117
6-11 24	.0010	.0015	.0318	.0453	.0088	.0439	9.9999	.0235	9.9999	.0593	.0235
12-17 24	.0049	.0079	.0469	.0539	.0055	.0368	.0444	.0520	.1051	.0777	.0531
18-23 24	.0036	.0035	.0217	.0254	.0048	.0166	.0148	.0131	.0363	.0277	.0156

	*** H2S (PPM) ***		AVERAGE	NO2(PPM)	SOLAR RADIATION (LANGLEYS)	***$ WIND *****		TEMP (DEG C)		AVERAGE
	GC-FPD	COLOR	OX(PPM)	COLOR		DIRECT (DEG)	SPEED (MPH)	AMB OUT	DEW POINT	SO2(PPM)
0- 5 19	-.0036	9.9999	.0109	.0782	0.00	76.9	1.4	25.00	10.40	.0038
6-11 19	.0028	9.9999	.0257	.1413	.36	104.8	1.8	17.88	8.32	.0091
12-17 19	.0149	.0014	.0440	.1579	.28	276.5	4.8	20.66	8.50	.0166
18-23 19	.0036	-.0014	-.0047	.0697	0.00	164.5	2.5	17.62	10.87	.0166
0- 5 20	.0027	-.0029	.0009	.0707	0.00	130.7	1.9	16.73	10.00	.0071
6-11 20	.0061	-.0020	.0130	.1034	.35	101.3	3.3	16.37	8.95	.0102
12-17 20	.0138	.0027	.0377	.0990	.27	279.2	5.2	18.63	9.36	.0109
18-23 20	.0031	.0021	.0138	.1063	0.00	233.2	1.9	17.76	10.38	.0057
0- 5 21	.0032	.0021	.0082	.0990	0.00	93.0	1.4	15.93	9.63	.0125
6-11 21	.0037	.0022	.0116	.0804	.20	65.6	2.0	15.55	8.13	.0090
12-17 21	.0057	.0024	.0364	.0508	.27	290.9	6.4	17.43	8.11	.0026
18-23 21	.0029	.0010	.0067	.0553	0.00	356.3	3.0	14.94	7.67	.0003
0- 5 22	.0039	-.0001	.0044	.0602	0.00	47.9	1.8	13.55	6.88	.0066
6-11 22	.0043	-.0008	.0188	.0665	.34	9.4	2.1	14.42	7.07	.0051
12-17 22	.0050	-.0019	.0441	.0320	.27	287.4	5.7	17.31	9.26	-.0032
18-23 22	.0034	-.0037	.0083	.0841	0.00	71.4	1.0	16.69	9.18	.0088
0- 5 23	.0043	-.0050	.0068	.0714	0.00	47.9	2.2	14.30	6.99	.0100
6-11 23	.0068	-.0055	.0240	.1219	.38	81.6	1.8	16.86	4.42	.0176
12-17 23	.0131	-.0027	.0476	.1064	.31	293.2	5.3	21.00	6.88	.0060
18-23 23	-.0006	-.0041	.0157	.1209	0.00	124.4	1.0	16.73	8.63	.0147
0- 5 24	.0005	-.0040	.0199	.1519	0.00	63.9	1.4	12.67	5.11	.0217
6-11 24	.0057	-.0029	.0264	.2167	.33	172.4	2.2	14.24	6.95	.0354
12-17 24	.0068	.0013	.0183	.1760	.27	276.6	5.1	19.58	10.88	.0695
18-23 24	.0034	.0009	.0107	.0773	0.00	154.9	4.0	20.82	10.87	.0215

MOBILE VAN LOCATION = LOS ANGELES; CALIFORNIA

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TIME DAY (PCT)	************ OZONE (PPM) ************ CHEM	GAS PH	COUL	COLOR	* OXIDANT (PPM) * COUL	COLOB	****************** SO2 (PPM) ****************** COLOR	FPD	COUL	COND	GC-FPD
0- 5 25	.0500	.0466	.0468	.0424	.0443	.0416	-.0003	-.0018	.0051	.0084	.0057
6-11 25	.0135	.0133	.0169	.0245	.0136	.0283	.0001	.0022	.0191	.0155	.0072
12-17 25	.0056	.0051	.0177	.0388	.0063	.0378	.0135	.0078	.0300	.0243	.0116
18-23 25	.0003	-.0007	.0049	.0239	.0043	.0326	.0014	-.0010	.0132	.0104	.0053
0- 5 26	.0011	.0002	.0023	.0171	.0043	.0259	.0005	-.0043	.0039	.0052	.0040
6-11 26	.0126	.0127	.0112	.0204	.0145	.0265	-.0005	-.0059	-.0049	.0026	.0002
12-17 26	.0175	.0174	.0147	.0229	.0187	.0294	-.0031	-.0057	-.0022	.0026	-.0047
18-23 26	.0012	.0000	.0018	.0100	.0029	.0157	-.0013	-.0053	.0092	.0031	.0016
0- 5 27	.0004	-.0009	.0054	.0084	.0009	.0082	.0005	-.0040	.0199	.0058	.0137
6-11 27	.0067	.0075	.0134	.0166	.0076	.0149	.0034	-.0030	.0200	.0077	.0128
12-17 27	.0106	.0106	.0114	.0157	.0100	.0199	.0011	-.0072	.0116	.0050	.0075
18-23 27	.0004	-.0008	.0021	.0045	.0020	.0092	-.0002	-.0084	.0124	.0056	.0046
0- 5 28	.0026	.0016	.0034	.0052	.0042	.0095	-.0006	-.0085	.0058	.0042	.0050
6-11 28	.0081	.0080	.0092	.0105	.0103	.0140	-.0005	-.0085	.0024	.0029	.0046
12-17 28	.0057	.0049	.0053	.0086	.0077	.0141	.0007	-.0084	.0011	.0006	.0027
18-23 28	.0030	.0023	.0023	.0047	.0050	.0096	.0007	-.0085	-.0013	-.0018	.0044
0- 5 29	.0119	.0106	.0096	.0105	.0122	.0134	.0014	-.0085	-.0044	-.0029	.0027
6-11 29	.0077	.0067	.0064	.0085	.0085	.0116	.0025	-.0085	-.0040	-.0023	.0042
12-17 29	.0045	.0040	.0083	.0133	.0071	.0159	.0059	-.0084	.0079	.0026	9.9999
18-23 29	.0034	.0030	.0018	.0048	.0059	.0125	-.0021	-.0086	.0014	.0014	9.9999
0- 5 30	.0017	.0001	.0004	.0025	.0035	.0098	.0017	-.0086	.0011	.0024	9.9999
6-11 30	.0037	.0031	.0027	.0048	.0065	.0139	.0011	-.0086	.0012	.0030	9.9999
12-17 30	.0063	.0060	.0030	.0087	.0087	.0221	.0023	-.0083	-.0072	.0041	9.9999
18-23 30	.0009	-.0006	9.9999	9.9999	.0031	9.9999	9.9999	-.0086	-.0095	9.9999	9.9999

	*** H2S (PPM) *** GC-FPD	COLOR	AVERAGE OX(PPM)	NO2(PPM) COLOR	SOLAR RADIATION (LANGLEYS)	***** WIND ***** DIRECT (DEG)	SPEED (MPH)	TEMP (DEG C) AMB OUT	DEW POINT	AVERAGE SO2(PPM)
0- 5 25	.0038	.0003	.0429	.0155	0.00	125.4	2.1	15.34	8.80	.0034
6-11 25	.0055	.0002	.0186	.0701	.11	86.5	2.2	15.30	8.45	.0097
12-17 25	.0070	-.0000	.0221	.1003	.04	153.6	3.2	21.55	9.94	.0174
18-23 25	.0060	.0007	.0184	.0882	0.00	89.7	2.2	40.43	11.54	.0058
0- 5 26	.0063	.0021	.0151	.0646	0.00	222.4	1.2	40.76	12.10	.0018
6-11 26	.0066	.0026	.0205	.0269	.32	285.2	5.5	32.82	12.06	-.0017
12-17 26	.0059	.0026	.0240	.0233	.36	294.9	11.8	16.92	8.38	-.0026
18-23 26	.0076	.0008	.0093	.0437	0.00	224.7	3.6	16.21	7.97	.0014
0- 5 27	.0113	.0006	.0048	.0457	0.00	107.6	1.4	16.81	7.22	.0072
6-11 27	.0113	.0001	.0112	.0395	.33	114.4	4.3	15.01	6.20	.0082
12-17 27	.0096	.0121	.0138	.0371	.27	235.2	7.2	14.99	4.60	.0038
18-23 27	.0091	-.0004	.0056	.0451	0.00	167.9	3.4	13.18	5.39	.0028
0- 5 28	.0097	.0010	.0068	.0331	0.00	104.9	4.1	13.68	6.27	.0012
6-11 28	.0101	.0022	.0122	.0224	.12	111.0	6.9	13.52	5.87	.0002
12-17 28	.0103	.0031	.0109	.0289	.08	125.0	8.4	20.11	7.96	-.0007
18-23 28	.0115	.0027	.0073	.0215	0.00	118.3	7.7	39.91	10.47	-.0013
0- 5 29	.0117	.0025	.0128	.0036	0.00	112.3	8.4	33.06	10.87	-.0023
6-11 29	.0123	.0024	.0100	.0089	.03	163.9	13.6	30.64	11.99	-.0016
12-17 29	9.9999	.0021	.0106	.0326	.06	282.6	5.8	25.12	9.45	.0017
18-23 29	9.9999	.0032	.0092	.0351	0.00	241.0	5.0	15.23	8.39	-.0020
0- 5 30	9.9999	.0017	.0067	.0393	0.00	117.3	2.3	13.21	6.94	-.0008
6-11 30	9.9999	-.0001	.0102	.0502	.22	98.5	4.0	13.39	7.79	-.0008
12-17 30	9.9999	.0027	.0118	.0618	.14	246.8	7.6	14.77	8.23	-.0042
18-23 30	9.9999	9.9999	.0031	9.9999	.01	13.7	13.6	13.08	8.29	-.0091

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          MOBILE VAN LOCATION =  LOS ANGELES; CALIFORNIA                                                  DEC 1970

          ************ OZONE (PPM) ************     * OXIDANT (PPM) *     ***************** SO2 (PPM) *****************
TIME DAY
(PCT)       CHEM     GAS PH      COUL      COLOR        COUL      COLOR       COLOR      FPD       COUL      COND      GC-FPD

0- 5  1    .0004     -.0011     9.9999    9.9999       .0016     9.9999      9.9999    -.0087     .0000    9.9999    9.9999
6-11  1   9.9999     9.9999     9.9999    9.9999      9.9999     9.9999      9.9999    9.9999    9.9999    9.9999    9.9999

          *** H2S (PPM) ***     AVERAGE    NO2(PPM)      SOLAR       **** WIND *****
                                                       RADIATION     DIRECT    SPEED            TEMP (DEG C)       AVERAGE
             GC-FPD      COLOR     OX(PPM)     COLOR     (LANGLEYS)    (DEG)     (MPH)            AMB       DEW
                                                                                                 OUT      POINT     SO2(PPM)
0- 5  1   9.9999      9.9999      .0016      9.9999        .01         75.5       2.4          11.69      7.69      -.0043
6-11  1   9.9999      9.9999     9.9999      9.9999      99.99        999.9     999.9         999.99    999.99      9.9999
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APPENDIX B.6

Air Quality Data From O_3, O_x, SO_2, H_2S and NO_2 Instruments, Twelve-Hour Averages

MOBILE VAN LOCATION = LOS ANGELES; CALIFORNIA

SEP 1970

TIME (PCT)	DAY	OZONE (PPM)				OXIDANT (PPM)		SO2 (PPM)				
		CHEM	GAS PH	COUL	COLOR	COUL	COLOR	COLOR	FPD	COUL	COND	GC-FPD
6-17	4	.0273	9.9999	.0420	.1126	.0328	.1174	.0001	.0015	9.9999	.0631	.0065
18- 5	4	.0137	9.9999	.0148	.0787	.0144	.0835	-.0044	-.0017	9.9999	.0188	.0011
6-17	5	.0462	9.9999	.0394	.1056	.0389	.1088	-.0020	.0038	9.9999	.0487	.0025
18- 5	5	.0150	9.9999	.0159	.1062	.0143	.1146	-.0021	.0021	9.9999	.0268	.0019
6-17	6	.0576	9.9999	.0691	.1753	.0580	.1653	.0038	.0086	9.9999	.0715	.0113
18- 5	6	.0173	9.9999	.0174	.1223	.0096	.1219	-.0005	.0050	9.9999	.0328	9.9999
6-17	7	.0358	9.9999	.0409	.1064	.0247	.0980	.0016	.0076	9.9999	.0642	.0076
18- 5	7	.0072	9.9999	.0144	.0063	.0042	.0030	.0068	.0081	9.9999	.0367	.0052
6-17	8	.0138	9.9999	.0227	.0467	.0116	.0162	.0147	.0136	9.9999	.0724	.0082
18- 5	8	.0020	9.9999	.0106	.0065	.0019	.0043	.0164	.0044	.0040	.0351	.0024
6-17	9	.0168	9.9999	.0312	.0313	.0146	.0288	.0014	.0172	.0380	.0845	.0128
18- 5	9	.0177	9.9999	.0172	.0047	.0083	.0852	-.0076	.0105	.0185	.0470	.0062
6-17	10	.0534	9.9999	.0739	.0833	.0416	.0635	.0034	.0233	.0374	.0842	.0178
18- 5	10	.0056	9.9999	.0151	.0101	.0055	.0087	-.0031	.0088	.0145	.0446	.0064
6-17	11	.0560	9.9999	.0725	-.1107	.0457	-.1214	.0074	.0277	.0489	.0806	.0230
18- 5	11	.0173	9.9999	.0252	-.2697	.0128	-.2765	-.0008	.0130	.0113	.0454	.0089
6-17	12	.0349	9.9999	.0410	-.1581	.0274	-.1813	.0025	.0106	.0140	.0320	.0090
18- 5	12	.0203	9.9999	.0217	.0214	.0148	.0186	.0043	.0092	.0099	.0136	.0089
6-17	13	.0239	9.9999	.0212	.0084	.0157	.0856	.0023	.0062	.0180	.0129	.0074
18- 5	13	.0157	.0112	.0127	-.0057	.0137	-.0005	-.0009	-.0006	.0021	.0041	.0022
6-17	14	.0312	.0261	.0209	-.0040	.0226	.0008	.0049	.0073	.0180	.0171	.0070
18- 5	14	.0065	-.0013	.0091	-.0072	.0077	-.0014	.0034	.0017	.0059	.0118	.0053
6-17	15	.0511	.0403	.0508	.0256	.0454	.0329	.0050	.0120	.0241	.0313	.0083
18- 5	15	.0040	.0030	.0082	-.0099	.0072	.0800	-.0025	.0037	.0153	.0140	.0053

TIME	DAY	H2S (PPM)		AVERAGE	NO2(PPM)	SOLAR	WIND		TEMP (DEG C)		AVERAGE
		GC-FPD	COLOR	OX(PPM)	COLOR	RADIATION (LANGLEYS)	DIRECT (DEG)	SPEED (MPH)	AMB OUT	DEW POINT	SO2(PPM)
6-17	4	.0020	9.9999	.0751	.1334	.85	273.4	6.4	20.90	12.57	.0165
18- 5	4	.0015	9.9999	.0489	.0498	.01	158.3	3.5	17.57	12.27	.0034
6-17	5	.0013	9.9999	.0738	.0426	.65	233.4	5.3	20.85	11.42	.0129
18- 5	5	.0017	9.9999	.0644	.0955	.01	347.3	2.8	18.37	10.83	.0074
6-17	6	.0001	9.9999	.1014	.0810	.67	317.7	4.2	26.25	7.33	.0249
18- 5	6	9.9999	9.9999	.0657	.0707	.01	197.9	3.1	20.15	13.72	.0121
6-17	7	.0020	9.9999	.0613	.0754	.64	265.0	4.4	22.85	14.36	.0208
18- 5	7	.0016	9.9999	.0036	.0659	.01	249.5	2.7	18.46	14.68	.0142
6-17	8	.0018	9.9999	.0139	.1239	.83	266.1	5.0	22.09	14.14	.0272
18- 5	8	.0013	9.9999	.0031	.0620	.01	256.9	2.5	17.62	13.47	.0125
6-17	9	.0021	9.9999	.0217	.1595	.62	267.8	4.6	22.83	13.95	.0299
18- 5	9	.0016	9.9999	.0070	.0940	.01	237.0	2.4	18.87	14.28	.0145
6-17	10	.0024	9.9999	.0526	.1152	.61	266.2	4.5	24.15	14.69	.0332
18- 5	10	.0018	9.9999	.0071	.0725	.01	242.4	2.0	19.80	14.66	.0142
6-17	11	.0025	9.9999	-.0379	.1525	.59	260.6	4.9	23.85	15.21	.0359
18- 5	11	.0017	9.9999	-.1318	.0534	.01	195.3	4.0	19.19	14.97	.0156
6-17	12	.0016	9.9999	-.0489	.0378	.41	222.3	5.1	20.96	14.94	.0147
18- 5	12	.0017	9.9999	.0167	.0385	.00	272.6	4.7	17.77	13.23	.0092
6-17	13	.0010	9.9999	.0113	.0296	.41	276.5	5.5	19.34	11.88	.0078
18- 5	13	.0007	9.9999	.0066	.0396	.01	290.6	3.5	17.47	10.96	.0014
6-17	14	.0001	9.9999	.0117	.0671	.57	253.9	5.3	19.55	11.06	.0093
18- 5	14	.0003	9.9999	.0031	.0690	.01	301.5	2.9	16.42	11.14	.0056
6-17	15	-.0003	9.9999	.0395	.1272	.60	310.7	4.6	21.00	10.89	.0170
18- 5	15	.0003	9.9999	.0036	.1034	.01	356.5	2.1	17.69	12.00	.0072

MOBILE VAN LOCATION = LOS ANGELES; CALIFORNIA

SEP 1970

TIME DAY (PCT)	OZONE (PPM) CHEM	GAS PH	COUL	COLOR	OXIDANT (PPM) COUL	COLOR	SO2 (PPM) COLOR	FPD	COUL	COND	GC-FPD
6-17 16	.0821	.0716	.0695	.0387	.0639	.0542	.0172	.0210	.0334	.0483	.0191
18- 5 16	.0012	.0019	.0105	-.0051	.0054	.0035	.0074	.0103	.0181	.0208	.0079
6-17 17	.0722	.0647	9.9999	9.9999	.0568	.0152	.0227	.0239	.0414	.0466	.0180
18- 5 17	.0014	.0021	9.9999	9.9999	.0066	.0822	-.0001	.0044	.0082	.0146	.0039
6-17 18	.0743	.0597	9.9999	9.9999	.0612	9.9999	.0112	.0146	.0269	.0445	.0109
18- 5 18	.0045	.0026	9.9999	9.9999	.0110	9.9999	.0012	.0029	.0055	.0074	.0044
6-17 19	.0579	.0386	9.9999	9.9999	.0473	9.9999	9.9999	9.9999	.0384	.0529	.0177
18- 5 19	.0123	.0125	9.9999	9.9999	.0121	9.9999	9.9999	9.9999	.0143	.0178	.0102
6-17 20	.0567	.0628	9.9999	9.9999	.0579	9.9999	9.9999	9.9999	.0152	.0251	.0139
18- 5 20	.0134	.0137	9.9999	9.9999	.0116	.0309	.0017	9.9999	.0092	.0089	.0075
6-17 21	.0491	.0397	9.9999	9.9999	.0350	.0773	.0026	9.9999	.0154	.0214	.0090
18- 5 21	.0193	.0133	9.9999	9.9999	.0187	.0617	.0042	9.9999	.0124	.0162	.0072
6-17 22	.0578	.0403	9.9999	9.9999	.0486	.1138	.0124	9.9999	.0285	.0582	.0154
18- 5 22	.0023	.0041	.0158	.0388	.0063	.0435	.0146	.0101	.0236	.0252	.0151
6-17 23	.0565	.0554	.0711	.1231	.0474	.1181	.0262	.0203	.0295	.0450	.0184
18- 5 23	.0019	.0016	.0138	.0366	.0035	.0377	.0200	.0142	.0181	.0264	.0112
6-17 24	.0704	.0597	.0536	.1237	.0483	.1419	9.9999	.0254	.0302	9.9999	.0156
18- 5 24	.0046	.0048	.0088	.0173	.0069	.0292	9.9999	.0130	.0180	9.9999	.0065
6-17 25	.1117	.0342	9.9999	9.9999	.0972	.1656	9.9999	.0206	.0397	9.9999	.0131
18- 5 25	0.0000	.0045	.0153	.0237	.0014	.0216	.0158	.0162	.0386	9.9999	.0135
6-17 26	.0534	.0548	9.9999	.0907	9.9999	.0908	.0185	.0184	.0291	9.9999	.0139
18- 5 26	.0018	.0073	9.9999	.0311	9.9999	.0387	9.9999	.0111	.0292	9.9999	.0070
6-17 27	.0463	.0558	9.9999	.0540	9.9999	.0619	9.9999	.0043	.0093	9.9999	.0041
18- 5 27	.0038	.0118	9.9999	.0192	9.9999	.0243	9.9999	.0090	.0219	9.9999	.0057

TIME DAY (PCT)	H2S (PPM) GC-FPD	COLOR	AVERAGE OX (PPM)	NO2 (PPM) COLOR	SOLAR RADIATION (LANGLEYS)	WIND DIRECT (DEG)	SPEED (MPH)	TEMP (DEG C) AMB OUT	DEW POINT	AVERAGE SO2 (PPM)
6-17 16	.0007	9.9999	.0590	.1717	.59	305.8	4.1	23.66	11.12	.0295
18- 5 16	.0006	9.9999	.0045	.1299	.01	314.4	1.8	19.07	12.33	.0129
6-17 17	.0023	9.9999	.03[illegible]0	9.9999	.56	267.3	3.9	22.91	13.08	.0309
18- 5 17	.0013	.0002	.0044	9.9999	.61	272.9	2.5	18.22	13.97	.0062
6-17 18	.0026	.0014	.0603	9.9999	.59	267.0	4.5	22.22	12.57	.0217
18- 5 18	.0020	.0020	.0110	9.9999	.01	259.3	3.1	17.05	12.46	.0043
6-17 19	.0028	.0005	.0473	9.9999	.61	255.9	3.8	20.74	11.52	.0339
18- 5 19	.0021	-.0009	.0121	9.9999	.01	212.4	2.9	17.33	12.43	.0141
6-17 20	.0024	-.0005	.0616	9.9999	.60	211.1	4.3	21.14	11.09	.0177
18- 5 20	.0027	-.0003	.0212	9.9999	.00	164.0	2.6	18.49	12.58	.0068
6-17 21	.0023	-.0003	.0476	9.9999	.56	237.8	4.6	21.19	12.97	.0121
18- 5 21	.0007	-.0002	.0402	9.9999	.00	342.5	2.2	18.94	13.32	.0100
6-17 22	.0021	.0001	.0695	9.9999	.59	312.3	4.4	26.96	7.39	.0296
18- 5 22	.0033	.0002	.0249	.1362	-.00	43.4	2.7	22.83	1.33	.0177
6-17 23	.0014	.0018	.0827	.1119	.58	244.5	4.8	26.14	1.46	.0279
18- 5 23	.0012	.0034	.0206	.1085	.00	200.9	2.0	21.91	13.47	.0168
6-17 24	.0023	.0045	.0951	.1473	.54	230.7	4.1	23.31	12.65	.0237
18- 5 24	.0012	.0052	.0180	.1316	.00	265.7	3.0	20.12	13.83	.0098
6-17 25	.0018	.0052	.1245	9.9999	.54	246.0	3.6	28.14	8.12	.0238
18- 5 25	.0021	.0051	.0115	.1116	-.01	88.3	2.5	24.50	-4.30	.0205
6-17 26	.0018	.0053	.0903	.1218	.61	327.9	4.3	28.94	-.44	.0200
18- 5 26	.0004	.0057	.0387	.1431	-.01	42.1	3.4	25.39	-3.92	.0160
6-17 27	-.0002	.0066	.0619	.0614	.57	103.0	4.0	32.05	.50	.0059
18- 5 27	.0005	.0076	.0243	.1051	-.01	36.7	3.8	26.02	-.68	.0122

MOBILE VAN LOCATION = LOS ANGELES, CALIFORNIA

SEP 1970

TIME DAY (PCT)	OZONE (PPM) CHEM	GAS PH	COUL	COLOR	OXIDANT (PPM) COUL	COLOR	SO2 (PPM) COLOR	FPD	COUL	COND	GC-FPD
6-17 28	.0112	9.9999	9.9999	.0239	9.9999	.0260	9.9999	.0096	.0254	9.9999	.0072
18- 5 28	.0021	-.0077	.0111	.0299	.0062	.0359	9.9999	.0054	.0287	9.9999	.0075
6-17 29	.0426	.0326	.0559	.0987	.0511	.0921	9.9999	9.9999	9.9999	9.9999	.0169
18- 5 29	.0055	-.0044	.0203	.0620	.0160	.0767	.0069	.0131	.0284	.0164	.0112
6-17 30	.0646	.0375	.0445	9.9999	.0528	9.9999	-.0004	.0120	.0322	.0201	.0128
18- 5 30	.0061	-.0043	.0161	9.9999	.0169	9.9999	-.0038	.0106	.0250	.0083	.0099

	H2S (PPM) GC-FPD	COLOR	AVERAGE OX(PPM)	NO2(PPM) COLOR	SOLAR RADIATION (LANGLEYS)	WIND DIRECT (DEG)	SPEED (MPH)	TEMP (DEG C) AMB OUT	DEW POINT	AVERAGE SO2(PPM)
6-17 28	.0006	.0077	.0228	.0975	.53	324.2	5.4	30.17	.45	.0141
18- 5 28	.0002	.1874	.0210	.1038	-.00	47.6	2.7	25.28	2.16	.0110
6-17 29	.0020	9.9999	.0666	.0858	.65	226.2	6.5	30.87	7.23	.0211
18- 5 29	.0030	9.9999	.0463	.1808	.00	327	2.2	23.54	9.59	.0152
6-17 30	.0028	.0115	.0603	.1535	.49	312.4	4.1	27.13	8.10	.0166
18- 5 30	.0021	.0116	.0169	.1798	0.00	24.9	2.8	21.46	9.15	.0100

MOBILE VAN LOCATION = LOS ANGELES; CALIFORNIA

OCT 1970

TIME (PCT)	DAY	OZONE (PPM)				OXIDANT (PPM)		SO2 (PPM)				
		CHEM	GAS PH	COUL	COLOR	COUL	COLOR	COLOR	FPD	COUL	COND	GC-FPD
6-17	1	.1010	.0854	9.9999	9.9999	.0940	9.9999	9.9999	.0170	.0460	.0341	.0229
18- 5	1	.0151	.0126	9.9999	9.9999	.0158	9.9999	9.9999	.0127	.0453	.0166	.0138
6-17	2	.0661	.0592	9.9999	9.9999	.0505	9.9999	9.9999	.0213	.0649	.0367	.0250
18- 5	2	.0004	.0000	.0208	.0117	.0018	.0846	9.9999	.0188	.0414	.0198	.0232
6-17	3	.0604	.0430	.0641	.0694	.0363	.0559	9.9999	.0212	.0481	.0287	.0309
18- 5	3	.0034	.0020	.0058	.0074	.0051	.0175	.0015	.0118	.0136	.0011	.0065
6-17	4	.0516	.0360	.0433	.0480	.0429	.0606	.0000	.0118	.0149	.0070	.0052
18- 5	4	.0172	.0109	.0150	.0131	.0139	.0175	-.0018	.0113	.0089	.0003	.0024
6-17	5	.0147	.0092	.0157	.0125	.0109	.0189	.0036	.0145	.0217	.0079	.0089
18- 5	5	.0218	.0149	.0185	.0189	.0158	.0202	-.0028	.0116	.0116	.0014	.0034
6-17	6	.0133	.0101	.0152	.0168	.0110	.0190	.0003	.0122	.0171	.0037	.0059
18- 5	6	.0313	.0208	.0252	.0228	.0251	.0256	-.0079	.0107	.0059	0.0000	.0008
6-17	7	.0286	.0242	.0250	.0218	.0188	.0222	.0019	.0126	.0219	.0000	.0096
18- 5	7	.0020	.0024	.0057	-.0060	.0052	.0811	-.0061	.0111	.0154	0.0000	.0037
6-17	8	.0347	.0338	.0381	.0346	.0368	.0445	-.0007	.0121	.0176	.0002	.0094
18- 5	8	.0015	.0018	.0053	-.0043	.0054	.0871	.0032	.0122	.0059	.0000	.0108
6-17	9	.0410	.0387	.0455	.0554	.0390	.0615	.0108	.0156	.0187	.0047	.0196
18- 5	9	.0016	.0023	.0070	.0058	.0040	.0124	.0049	.0146	.0082	.0024	.0124
6-17	10	.0556	.0449	.0485	.0506	.0434	.0541	.0079	.0152	.0099	.0035	.0139
18- 5	10	.0306	.0225	.0274	.0334	.0234	.0385	.0087	.0152	.0080	.0017	.0126
6-17	11	.0736	.0568	.0674	.0739	.0611	.0771	.0132	.0163	.0188	.0032	.0155
18- 5	11	.0261	.0193	.0204	.0255	.0177	.0298	.0073	.0136	.0030	0.0000	.0094
6-17	12	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999
18- 5	12	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999

		H2S (PPM)		AVERAGE	NO2(PPM)	SOLAR	WIND		TEMP (DEG C)		AVERAGE
		GC-FPD	COLOR	OX(PPM)	COLOR	RADIATION (LANGLEYS)	DIRECT (DEG)	SPEED (MPH)	AMB OUT	DEW POINT	SO2(PPM)
6-17	1	.0028	9.9999	.0940	9.9999	.50	299.7	3.7	26.35	7.39	.0293
18- 5	1	.0024	9.9999	.0158	9.9999	-.00	127.9	1.9	21.75	12.32	.0221
6-17	2	.0034	9.9999	.0522	9.9999	.41	205.3	3.7	25.98	11.82	.0382
18- 5	2	.0023	9.9999	.0032	.1130	.00	233.3	3.5	23.24	16.66	.0258
6-17	3	.0034	9.9999	.0461	.1281	.30	226.8	3.3	24.62	15.86	.0335
18- 5	3	.0020	9.9999	.0113	.1032	.00	252.4	2.0	22.62	15.48	.0069
6-17	4	.0017	9.9999	.0518	.1237	.47	266.6	4.9	23.60	15.50	.0078
18- 5	4	0.0000	9.9999	.0157	.0523	.00	253.8	3.6	20.21	14.50	.0042
6-17	5	0.0000	9.9999	.0149	.0756	.24	257.5	5.2	19.98	13.96	.0113
18- 5	5	0.0000	9.9999	.0180	.0384	.00	258.8	3.9	19.19	13.86	.0051
6-17	6	0.0000	9.9999	.0150	.0612	.12	234.2	5.1	19.21	13.36	.0079
18- 5	6	0.0000	9.9999	.0253	.0286	.00	298.2	5.5	18.41	13.20	.0019
6-17	7	0.0000	9.9999	.0197	.0599	.47	252.8	4.8	19.98	11.23	.0094
18- 5	7	.0001	9.9999	.0032	.0722	.00	1.2	2.9	17.32	11.34	.0048
6-17	8	.0004	9.9999	.0406	.1065	.52	344.1	4.1	22.77	2.12	.0077
18- 5	8	.0011	9.9999	.0062	.1082	-.00	48.3	2.6	19.04	2.09	.0064
6-17	9	.0017	9.9999	.0479	.1232	.52	290.5	4.2	23.01	2.90	.0139
18- 5	9	.0007	9.9999	.0082	.0944	.00	318.2	2.6	18.92	11.69	.0065
6-17	10	.0016	9.9999	.0487	.0819	.51	230.4	4.1	20.99	10.06	.0101
18- 5	10	.0027	9.9999	.0309	.0868	.00	211.7	2.2	21.25	14.12	.0092
6-17	11	.0030	9.9999	.0691	.0912	.47	240.9	3.0	22.24	13.26	.0118
18- 5	11	.0022	9.9999	.0237	.0663	.00	267.1	3.1	21.00	14.24	.0067
6-17	12	9.9999	9.9999	9.9999	9.9999	.32	251.4	4.1	19.98	13.25	9.9999
18- 5	12	9.9999	9.9999	9.9999	9.9999	.00	259.2	2.6	18.44	12.93	9.9999

MOBILE VAN LOCATION = LOS ANGELES; CALIFORNIA

OCT 1970

TIME DAY (PCT)	OZONE (PPM)				OXIDANT (PPM)		SO2 (PPM)				
	CHEM	GAS PH	COUL	COLOR	COUL	COLOR	COLOR	FPD	COUL	COND	GC-FPD
6-17 13	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999
18- 5 13	.0209	.0174	.0169	.0256	.0159	.0200	9.9999	.0145	-.0019	0.0000	.0073
6-17 14	.0201	.0171	9.9999	9.9999	.0137	9.9999	9.9999	.0104	.0031	0.0000	.0076
18- 5 14	.0035	.0040	9.9999	9.9999	.0051	9.9999	9.9999	.0066	.0085	0.0000	.0052
6-17 15	.0356	.0324	9.9999	9.9999	.0273	9.9999	9.9999	.0109	.0143	0.0000	.0092
18- 5 15	.0211	.0190	9.9999	9.9999	.0193	9.9999	9.9999	.0027	-.0029	0.0000	.0026
6-17 16	.0262	.0367	9.9999	9.9999	.0324	9.9999	9.9999	.0111	.0137	.0007	.0085
18- 5 16	.0122	.0113	.0133	.0230	.0122	.0297	9.9999	.0109	.0057	0.0000	.0058
6-17 17	.0725	.0609	.0655	.0812	.0585	.0823	9.9999	.0130	.0099	.0160	.0076
18- 5 17	.0153	.0138	.0179	.0298	.0155	.0362	9.9999	.0088	.0082	.0057	.0066
6-17 18	.0813	.0638	.0802	.0998	.0585	.0885	9.9999	.0234	.0282	.0394	.0197
18- 5 18	.0235	.0171	.0232	.0338	.0165	.0332	9.9999	.0105	.0120	.0090	.0094
6-17 19	.0373	.0287	.0221	.0339	.0280	.0523	9.9999	.0125	.0150	.0159	.0104
18- 5 19	.0247	.0170	.0217	.0343	.0191	.0390	.0008	.0120	.0072	.0060	.0075
6-17 20	.0217	.0151	.0186	.0275	.0164	.0319	.0015	.0062	.0070	.0070	.0075
18- 5 20	.0017	.0017	.0031	.0105	.0033	.0177	.0010	.0016	.0071	.0030	.0059
6-17 21	.0068	.0052	.0157	9.9999	.0038	9.9999	.0139	.0099	.0210	.0184	.0163
18- 5 21	.0021	.0015	.0026	9.9999	.0022	9.9999	.0041	-.0044	.0051	.0020	.0123
6-17 22	.0121	.0124	.0163	9.9999	.0183	9.9999	.0149	.0017	.0156	.0132	.0118
18- 5 22	.0008	.0006	.0027	9.9999	.0018	9.9999	9.9999	-.0069	.0098	.0045	.0136
6-17 23	.0068	.0058	9.9999	9.9999	.0058	9.9999	9.9999	.0023	.0185	.0106	.0116
18- 5 23	.0020	.0015	9.9999	9.9999	.0032	.0153	9.9999	-.0057	.0086	.0006	.0033
6-17 24	.0175	.0163	9.9999	9.9999	.0136	.0285	9.9999	.0005	.0126	.0078	.0128
18- 5 24	.0020	.0019	9.9999	9.9999	.0035	.0194	9.9999	-.0075	.0099	.0014	.0074

TIME DAY (PCT)	H2S (PPM)		AVERAGE	NO2(PPM)	SOLAR	WIND		TEMP (DEG C)		AVERAGE
	GC-FPD	COLOR	OX(PPM)	COLOR	RADIATION (LANGLEYS)	DIRECT (DEG)	SPEED (MPH)	AMB OUT	DEW POINT	SO2(PPM)
6-17 13	9.9999	9.9999	9.9999	.0775	.36	242.8	4.7	19.82	11.99	9.9999
18- 5 13	.0025	9.9999	.0204	.0567	.00	286.7	2.8	18.09	12.41	.0058
6-17 14	.0025	9.9999	.0137	.0668	.29	279.7	5.3	19.26	11.36	.0053
18- 5 14	.0018	9.9999	.0051	9.9999	.00	357.3	3.1	16.35	10.30	.0031
6-17 15	.0027	9.9999	.0273	9.9999	.35	319.5	4.0	18.34	10.58	.0086
18- 5 15	.0016	9.9999	.0193	9.9999	0.00	294.1	3.3	18.26	12.21	.0006
6-17 16	.0023	9.9999	.0371	9.9999	.40	249.1	4.2	19.03	12.35	.0085
18- 5 16	.0022	9.9999	.0209	.0741	.00	273.3	2.3	17.89	12.59	.0056
6-17 17	.0023	9.9999	.0704	.0777	.41	261.0	3.8	19.51	12.29	.0117
18- 5 17	.0022	9.9999	.0258	.0832	.00	197.8	2.4	18.79	12.84	.0073
6-17 18	.0034	9.9999	.0735	.0987	.37	233.7	3.2	19.49	12.25	.0276
18- 5 18	.0021	9.9999	.0248	.0582	0.00	233.0	2.6	18.09	12.66	.0102
6-17 19	.0024	9.9999	.0402	.0928	.40	232.0	4.4	19.58	12.08	.0125
18- 5 19	.0030	9.9999	.0290	.0688	0.00	230.7	2.7	17.93	12.19	.0067
6-17 20	.0027	9.9999	.0242	.0620	.34	216.5	6.1	19.08	11.25	.0059
18- 5 20	.0024	9.9999	.0105	.0662	0.00	151.7	2.5	16.58	10.70	.0038
6-17 21	.0033	9.9999	.0053	.0806	.30	267.4	4.9	17.98	11.19	.0159
18- 5 21	.0027	9.9999	.0022	.0569	0.00	217.3	3.3	16.72	10.89	.0038
6-17 22	.0022	9.9999	.0103	.0791	.34	231.9	4.8	17.60	9.26	.0108
18- 5 22	.0012	9.9999	.0018	.0720	0.00	56.6	3.2	15.85	10.10	.0052
6-17 23	.0024	9.9999	.0083	9.9999	.25	105.6	5.1	17.95	10.66	.0095
18- 5 23	.0012	.0005	.0092	9.9999	0.00	256.4	3.3	18.46	12.54	.0004
6-17 24	.0024	.0003	.0211	9.9999	.29	242.1	3.9	18.42	11.33	.0084
18- 5 24	.0021	.0007	.0114	9.9999	.00	31.2	2.7	16.26	10.66	.0028

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        MOBILE VAN LOCATION =  LOS ANGELES: CALIFORNIA                                              OCT 1970

              ************* OZONE (PPM) *************     * OXIDANT (PPM) *    ****************** SO2 (PPM) ******************
  TIME DAY
  (PCT)       CHEM     GAS PH      COUL      COLOR       COUL     COLOR      COLOR      FPD      COUL      COND     GC-FPD

   6-17 25    .0314     .0296     9.9999    9.9999      .0242    .0366     9.9999   -.0066     .0097     .0068     .0199
  18- 5 25    .0027     .0023     9.9999    9.9999      .0043    .0244     9.9999   -.0013     .0158     .0076     .0185
   6-17 26    .0154     .0174     9.9999    9.9999      .0170    .0402     9.9999    .0015     .0164     .0121     .0128
  18- 5 26   -.0000     .0001     9.9999    9.9999      .0020    .0254      .0103    .0067     .0281     .0146     .0122
   6-17 27    .0185     .0197     9.9999    9.9999      .0152    .0421      .0212    .0148     .0320     .0266     .0234
  18- 5 27   0.0000     .0002      .0135     .0085      .0007    .0030      .0179    .0071     .0277     .0144     .0173
   6-17 28    .0108     .0096      .0210     .0200      .0121    .0196      .0176    .0036     .0202     .0142     .0149
  18- 5 28   0.0000     .0004      .0129     .0152      .0018    .0123      .0225    .0039     .0251     .0100     .0175
   6-17 29    .0083     .0115      .0245     .0384      .0149    .0413      .0232    .0057     .0227     .0150    9.9999
  18- 5 29    .0002     .0002      .0306     .0558      .0060    .0500      .0417    .0169     .0495     .0332    9.9999
   6-17 30    .0270     .0283      .0511     .0717      .0235    .0621      .0481    .0247     .0480     .0400     .0247
  18- 5 30    .0001     .0002      .0125     .0354      .0033    .0365      .0319    .0051     .0240     .0114     .0029
   6-17 31    .0514     .0507      .0608     .0924      .0479    .0921      .0380    .0086     .0238     .0258     .0044
  18- 5 31   0.0000     .0003      .0166     .0444      .0049    .0469      .0394    .0044     .0336     .0174     .0040

              *** H2S (PPM) ***    AVERAGE    NO2(PPM)     SOLAR      **** WIND *****              TEMP (DEG C)     AVERAGE
                                                         RADIATION    DIRECT     SPEED             AMB       DEW
              GC-FPD     COLOR     OX(PPM)     COLOR    (LANGLEYS)    (DEG)      (MPH)             OUT      POINT    SO2(PPM)
   6-17 25    .0024      .0005      .0304     9.9999       .44        155.0       4.1             17.54      8.20     .0075
  18- 5 25    .0023      .0003      .0143     9.9999      -.00         57.1       1.8             13.91      5.51     .0101
   6-17 26    .0027      .0012      .0286     9.9999       .45        256.4       4.1             17.24      4.89     .0119
  18- 5 26    .0029      .0045      .0137     9.9999      -.00         40.2       2.8             15.03      5.30     .0134
   6-17 27    .0033      .0058      .0287     9.9999       .44        287.7       5.3             20.24     -6.03     .0236
  18- 5 27    .0032      .0072      .0018      .0689      -.01         32.3       2.5             16.59     -8.93     .0169
   6-17 28    .0034      .0082      .0168      .1046       .41        181.6       1.9             21.35     -5.47     .0141
  18- 5 28    .0021      .0087      .0071      .0785      -.01         61.8       3.3             17.70     -8.89     .0158
   6-17 29   9.9999      .0101      .0281      .1184       .41        351.3       3.5             24.18     -4.38     .0167
  18- 5 29   9.9999      .0125      .0280      .1790      -.00         65.6        .8             16.52       .47     .0353
   6-17 30    .0090      .0136      .0428      .1703       .38        230.4       3.8             20.98      1.26     .0378
  18- 5 30    .0051      .0144      .0199      .0980      0.00         63.6       2.3             15.34      3.60     .0150
   6-17 31    .0060      .0156      .0700      .1202       .44        298.1       3.5             20.03      2.53     .0201
  18- 5 31    .0067      .0159      .0259      .1352      0.00        116.7       1.1             15.73      8.33     .0198
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         MOBILE VAN LOCATION =  LOS ANGELES; CALIFORNIA                                          NOV 1970

            ************* OZONE (PPM) *************     * OXIDANT (PPM) *     ****************** SO2 (PPM) ******************
 TIME DAY
 (PCT)      CHEM      GAS PH      COUL      COLOR       COUL      COLOR       COLOR      FPD      COUL      COND      GC-FPD

  6-17  1   .0838     .0276      .0916     .1217       .0288     .1148       .0494     .0141     .0320     .0353     .0126
 18- 5  1   .0004     .0006      .0163     .0213       .0026     .0179       .0500     .0074     .0233     .0125     .0050
  6-17  2   .0287     .0297     9.9999    9.9999       .0243    9.9999      9.9999     .0189     .0386     .0321     .0154
 18- 5  2   .0000     .0002     9.9999    9.9999       .0038    9.9999      9.9999     .0061     .0177     .0116    -.0027
  6-17  3   .0120     .0109     9.9999    9.9999       .0135    9.9999      9.9999     .0164     .0343     .0281     .0121
 18- 5  3   .0016     .0014      .0052     .0212       .0024     .0251      9.9999     .0041     .0166     .0067    -.0007
  6-17  4   .0117     .0124      .0241     .0414       .0061     .0364      9.9999     .0153     .0315     .0237     .0189
 18- 5  4   .0001     .0002      .0028     .0169       .0011     .0197       .0026     .0023     .0183     .0013     .0049
  6-17  5   .0049     .0063      .0194     .0350       .0028     .0279       .0232     .0132     .0387     .0221     .0181
 18- 5  5   .0002     .0003      .0034     .0043       .0004     .0837       .0071     .0024     .0035     .0025     .0066
  6-17  6   .0036     .0047      .0043     .0092       .0038     .0117       .0050     .0003    -.0087     .0008     .0063
 18- 5  6   .0000     .0000     -.0001     .0103       .0013     .0146       .0015    -.0021    -.0029     .0002     .0044
  6-17  7   .0115     .0125      .0099     .0221       .0129     .0292       .0035    -.0016    -.0076     .0003     .0023
 18- 5  7  0.0000    -.0001      .0015     .0152       .0009     .0194       .0065     .0004     .0026     .0006     .0060
  6-17  8   .0222     .0227      .0205     .0404       .0240     .0507       .0039     .0017    -.0072     .0018     .0019
 18- 5  8  0.0000    -.0000      .0042     .0277       .0030     .0349       .0093     .0029     .0039     .0050     .0087
  6-17  9   .0168     .0200      .0211     .0465       .0212     .0550       .0089     .0034    -.0016     .0072     .0061
 18- 5  9   .0000    -.0000      .0047     .0272       .0012     .0312       .0123     .0042     .0046     .0052     .0123
  6-17 10   .0096     .0207      .0353    9.9999       .0194     .0785       .0244     .0156     .0164     .0249     .0316
 18- 5 10  9.9999    -.0000      .0024    9.9999       .0032    9.9999       .0068     .0042    -.0070     .0066     .0129
  6-17 11  9.9999     .0199      .0314    9.9999       .0154    9.9999       .0221     .0195     .0138     .0296     .0361
 18- 5 11   .0008     .0002      .0122    9.9999       .0012    9.9999       .0199     .0137    -.0023     .0167     .0279
  6-17 12   .0069     .0087      .0170    9.9999       .0075    9.9999       .0184     .0094    -.0049     .0221     .0231
 18- 5 12   .0002    -.0004      .0092    -.0020       .0014    -.0807       .0237     .0071    -.0048     .0155     .0239

           *** H2S (PPM) ***   AVERAGE   NO2(PPM)       SOLAR      ***** WIND *****
                                                      RADIATION     DIRECT    SPEED             TEMP (DEG C)       AVERAGE
            GC-FPD    COLOR    OX(PPM)    COLOR     (LANGLEYS)     (DEG)     (MPH)            AMB        DEW
                                                                                             OUT       POINT    SO2(PPM)
  6-17  1   .0069     .0179     .0928     .1322         .42        255.6      3.0            20.76       5.93     .0287
 18- 5  1   .0057     .0174     .0103     .0985        0.00        150.1      1.5            25.41      11.81     .0196
  6-17  2   .0039    9.9999     .0268    9.9999         .36        277.3      4.3            22.11      11.48     .0282
 18- 5  2  -.0024    9.9999     .0038    9.9999        0.00        185.9      1.8            28.64      11.61     .0082
  6-17  3   .0043    9.9999     .0202    9.9999         .35        282.5      4.8            19.42      10.71     .0227
 18- 5  3  -.0018    9.9999     .0137     .0640        0.00        244.1      2.2            17.30      10.49     .0067
  6-17  4   .0038    9.9999     .0212     .0930         .22        243.8      3.4            17.76      10.33     .0222
 18- 5  4   .0044    9.9999     .0104     .0428        0.00        234.5      1.5            17.30      10.52     .0043
  6-17  5   .0057    9.9999     .0154     .0900         .22        191.4      3.1            20.71      12.12     .0220
 18- 5  5   .0041     .0054     .0020     .0228        0.00        259.1      3.6            30.80      14.71     .0044
  6-17  6   .0050     .0082     .0077     .0284         .24        268.0      6.3            30.00      13.37     .0022
 18- 5  6   .0040     .0097     .0080     .0279        0.00        271.9      2.9            21.21      11.20     .0002
  6-17  7   .0045     .0142     .0211     .0393         .40        254.0      5.3            19.28       9.38    -.0006
 18- 5  7   .0050     .0200     .0101     .0446        0.00         45.9      2.6            15.29       7.52     .0032
  6-17  8   .0055     .0248     .0373     .0650         .43          6.3      3.3            20.36       5.53     .0004
 18- 5  8   .0058     .0290     .0189     .0793        0.00         64.3      1.6            16.57       5.27     .0059
  6-17  9   .0077     .0338     .0381     .0808         .38        325.7      4.1            21.81       3.25     .0048
 18- 5  9   .0063     .0329     .0162     .0709        0.00         97.4      1.7            20.28       9.93     .0077
  6-17 10   .0082     .0429     .0343     .1329         .35        282.3      3.9            20.27       9.14     .0226
 18- 5 10   .0068     .0485     .0032     .0919        0.00        237.8      1.6            23.17      11.69     .0047
  6-17 11   .0078     .0531     .0154     .1371         .29        228.8      3.7            19.67      11.41     .0242
 18- 5 11   .0068     .0571     .0012     .0712        0.00        214.6      2.2            18.68      11.57     .0152
  6-17 12   .0088     .0606     .0071     .0810         .32        194.9      6.4            19.48       8.73     .0144
 18- 5 12   .0078     .0640     .0004     .0873        0.00         93.6      2.5            15.88       8.58     .0131
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     MOBILE VAN LOCATION =  LOS ANGELES; CALIFORNIA                                        NOV 1970

            ************* OZONE (PPM) *************     * OXIDANT (PPM) *    ***************** SO2 (PPM) *****************
 TIME DAY
 (RCT)      CHEM      GAS PH      COUL      COLOR       COUL      COLOR       COLOR      FPD      COUL      COND     GC-FPD

  6-17 13   .0161     .0152      .0351     .0252       .0145     .0165       .0347     .0161     .0145    .0333     .0419
 18- 5 13   .0002    -.0004     9.9999    9.9999       .0022    9.9999      9.9999     .0195     .0415    .0373     .0519
  6-17 14   .0041     .0043     9.9999    9.9999       .0059    9.9999      9.9999     .0060    -.0053    .0144     .0231
 18- 5 14   .0001    -.0004     -.0005     .0080       .0008     .0156      9.9999    -.0006    -.0107    .0033     .0169
  6-17 15   .0186     .0164      .0093     .0224       .0169     .0352      9.9999    -.0033    -.0268    .0007     .0110
 18- 5 15  9.9999    9.9999     9.9999    9.9999      9.9999    9.9999      9.9999    9.9999    9.9999   9.9999    9.9999
  6-17 16  9.9999    9.9999     9.9999    9.9999      9.9999    9.9999      9.9999    9.9999    9.9999   9.9999    9.9999
 18- 5 16  9.9999    9.9999     9.9999    9.9999      9.9999    9.9999      9.9999    9.9999    9.9999   9.9999    9.9999
  6-17 17   .0155     .0186      .0381     .0907       .0301     .1096      9.9999     .0091     .0154    .0231     .0340
 18- 5 17   .0005    -.0002      .0068     .0329       .0033     .0475      9.9999     .0043     .0056    .0123     .0271
  6-17 18   .0185     .0173      .0334     .0640       .0130     .0619      9.9999     .0286     .0345    .0359     .0279
 18- 5 18   .0005    -.0006      .0026     .0131       .0035     .0233       .0065     .0063    -.0095    .0054     .0129
  6-17 19   .0189     .0199      .0325     .0395       .0246     .0485       .0129     .0110     .0004    .0317     .0137
 18- 5 19   .0017     .0006      .0103    -.0062       .0026    -.0865       .0141     .0114    -.0059    .0254     .0145
  6-17 20   .0201     .0209      .0268     .0245       .0215     .0309       .0103     .0086    -.0057    .0263     .0132
 18- 5 20   .0004    -.0004      .0078     .0093       .0048     .0171       .0078     .0047    -.0084    .0229     .0106
  6-17 21   .0218     .0214      .0229     .0219       .0210     .0269       .0059     .0039    -.0113    .0221     .0084
 18- 5 21   .0003    -.0007      .0033     .0017       .0033     .0077       .0025    -.0026    -.0072    .0159     .0085
  6-17 22   .0294     .0285      .0298     .0240       .0318     .0312       .0016    -.0028    -.0140    .0167     .0033
 18- 5 22   .0003    -.0008      .0081     .0085       .0083     .0119       .0067     .0022     .0060    .0233     .0089
  6-17 23   .0182     .0197      .0317     .0379       .0267     .0449       .0066     .0047     .0187    .0328     .0043
 18- 5 23   .0003    -.0006      .0168     .0246       .0068     .0289       .0166     .0102    9.9999    .0360     .0091
  6-17 24   .0029     .0047      .0378     .0487       .0072     .0407      9.9999     .0378    9.9999    .0685     .0383
 18- 5 24   .0268     .0250      .0342     .0339       .0246     .0291       .0072     .0056     .0287    .0181     .0106

            *** H2S (PPM) ***   AVERAGE    NO2(PPM)     SOLAR       **** WIND *****          TEMP (DEG C)      AVERAGE
                                                      RADIATION     DIRECT     SPEED          AMB       DEW
            GC-FPD     COLOR    OX(PPM)    COLOR     (LANGLEYS)     (DEG)      (MPH)          OUT      POINT     SO2(PPM)
  6-17 13   .0095      .0667     .0157     .1312         .39        252.6       3.5          21.80     -1.47      .0271
 18- 5 13   .0088     9.9999     .0022    9.9999        0.00         65.8       1.4          17.79     -1.79      .0376
  6-17 14   .0077     9.9999     .0094    9.9999         .33        110.6       4.4          22.15     -3.80      .0095
 18- 5 14   .0069     9.9999     .0082     .0596        0.00         51.5       3.0          17.70     -5.19      .0022
  6-17 15   .0066     9.9999     .0260     .0495         .38         82.0       3.7          22.12     -4.84     -.0046
 18- 5 15  9.9999     9.9999    9.9999    9.9999       99.99        999.9     999.9         999.99    999.99     9.9999
  6-17 16  9.9999     9.9999    9.9999    9.9999       99.99        999.9     999.9         999.99    999.99     9.9999
 18- 5 16  9.9999     9.9999    9.9999    9.9999       99.99        999.9     999.9         999.99    999.99     9.9999
  6-17 17   .0079     9.9999     .0594     .2463         .38        284.2       2.9          21.60      2.99      .0206
 18- 5 17   .0023     9.9999     .0254     .1624        0.00         75.3       1.2          15.75      7.77      .0123
  6-17 18   .0044     9.9999     .0374     .1887         .31        226.1       3.3          16.44      8.49      .0337
 18- 5 18  -.0050     9.9999     .0134     .0879        0.00        103.7       1.6          25.62     10.62      .0043
  6-17 19   .0088     9.9999     .0349     .1513         .32        267.7       3.3          19.27      8.41      .0129
 18- 5 19   .0031     -.0021    -.0019     .0702        0.00        147.7       2.2          17.18     10.44      .0119
  6-17 20   .0099      .0009     .0254     .1010         .31        277.6       4.2          17.50      9.15      .0106
 18- 5 20   .0032      .0021     .0110     .1026        0.00        114.0       1.7          16.85     10.00      .0091
  6-17 21   .0047      .0023     .0240     .0656         .24        324.7       4.2          16.49      8.12      .0058
 18- 5 21   .0034      .0004     .0055     .0578        0.00         32.5       2.4          14.24      7.27      .0034
  6-17 22   .0047     -.0013     .0315     .0492         .30        297.9       3.9          15.88      8.16      .0009
 18- 5 22   .0038     -.0044     .0076     .0777        0.00         55.3       1.6          15.50      8.09      .0094
  6-17 23   .0099     -.0041     .0358     .1142         .35        331.6       3.5          18.93      5.65      .0118
 18- 5 23  -.0000     -.0041     .0178     .1364        0.00         85.3       1.2          14.70      6.87      .0182
  6-17 24   .0063     -.0012     .0223     .1945         .30        250.3       3.6          16.91      8.92      .0525
 18- 5 24   .0036      .0006     .0268     .0464        0.00        139.4       3.1          18.08      9.84      .0125
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        MOBILE VAN LOCATION =  LOS ANGELES; CALIFORNIA                                                   NOV 1970

              ************* OZONE (PPM) *************     * OXIDANT (PPM) *     ****************** SO2 (PPM) ******************
  TIME DAY
  (PCT)       CHEM     GAS PH      COUL      COLOR         COUL     COLOR         COLOR      FPD      COUL      COND     GC-FPD

   6-17 25   .0096     .0092      .0174     .0331         .0099    .0340         .0081     .0050     .0245     .0199     .0094
  18- 5 25   .0007    -.0003      .0036     .0205         .0043    .0292         .0009    -.0027     .0085     .0078     .0046
   6-17 26   .0150     .0150      .0129     .0217         .0166    .0280        -.0018    -.0058    -.0036     .0026    -.0023
  18- 5 26   .0008    -.0004      .0036     .0092         .0019    .0122        -.0004    -.0046     .0146     .0044     .0077
   6-17 27   .0086     .0090      .0126     .0162         .0088    .0172         .0024    -.0051     .0158     .0063     .0101
  18- 5 27   .0015     .0004      .0028     .0049         .0031    .0093        -.0004    -.0084     .0091     .0049     .0048
   6-17 28   .0069     .0064      .0073     .0096         .0090    .0140         .0001    -.0084     .0018     .0018     .0036
  18- 5 28   .0075     .0064      .0060     .0076         .0086    .0115         .0010    -.0085    -.0029    -.0023     .0035
   6-17 29   .0061     .0053      .0072     .0107         .0078    .0136         .0040    -.0085     .0019     .0002     .0037
  18- 5 29   .0025     .0016      .0011     .0036         .0047    .0112        -.0002    -.0086     .0012     .0019    9.9999
   6-17 30   .0050     .0045      .0028     .0061         .0076    .0167         .0015    -.0085    -.0030     .0034    9.9999
  18- 5 30   .0007    -.0008     9.9999    9.9999         .0024   9.9999        9.9999    -.0086    -.0047    9.9999    9.9999

              *** H2S (PPM) ***   AVERAGE   NO2(PPM)      SOLAR      ***% WIND *%***                TEMP (DEG C)     AVERAGE
                                                        RADIATION    DIRECT     SPEED                AMB       DEW
             GC-FPD     COLOR    OX,PPM,     COLOR     (LANGLEYS)    (DEG)      (MPH)                OUT      POINT    SO2,PPM,
   6-17 25   .0063     .0001      .0203      .0882        .08        117.3       2.7                18.43      9.20     .0136
  18- 5 25   .0061     .0014      .0168      .0764       0.00        126.0       1.7                40.68     11.82     .0038
   6-17 26   .0062     .0026      .0223      .0251        .34        290.1       8.7                24.87     10.22    -.0022
  18- 5 26   .0094     .0007      .0071      .0447       0.00        141.6       2.5                16.51      7.60     .0043
   6-17 27   .0105     .0055      .0125      .0386        .38        182.1       5.7                15.00      5.40     .0060
  18- 5 27   .0094     .0003      .0062      .0391       0.00        136.4       3.8                13.43      5.83     .0020
   6-17 28   .0102     .0027      .0115      .0257        .10        117.9       7.7                16.82      6.92    -.0002
  18- 5 28   .0116     .0026      .0100      .0125       0.08        115.3       8.1                36.48     10.67    -.0018
   6-17 29   .0123     .0023      .0103      .0197        .05        229.9       9.7                27.88     10.72     .0000
  18- 5 29  9.9999     .0025      .0080      .0372       0.00        217.5       3.7                14.22      7.67    -.0014
   6-17 30  9.9999     .0010      .0110      .0541        .18        111.6       5.8                14.08      8.01    -.0025
  18- 5 30  9.9999    9.9999      .0024     9.9999        .01         68.8       8.0                12.39      7.99    -.0067
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            MOBILE VAN LOCATION =  LOS ANGELES; CALIFORNIA                                         DEC 1970

            ************* OZONE (PPM) *************      * OXIDANT (PPM) *     ****************** SO2 (PPM) ******************
TIME DAY
(PCT)         CHEM      GAS PH      COUL      COLOR       COUL      COLOR       COLOR      FPD        COUL       COND     GC-FPD

 6-17  1   9.9999     9.9999     9.9999     9.9999      9.9999    9.9999      9.9999    9.9999     9.9999    9.9999     9.9999

            *** H2S (PPM) ***     AVERAGE   NO2(PPM)     SOLAR       **** WIND *****               TEMP (DEG C)      AVERAGE
                                                        RADIATION     DIRECT    SPEED               AMB       DEW
           GC-FPD      COLOR      OX(PPM)    COLOR     (LANGLEYS)    (DEG)     (MPH)                OUT      POINT    SO2(PPM)
 6-17  1 9.9999      9.9999     9.9999     9.9999       99.99       999.9     999.9              999.99    999.99     9.9999
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APPENDIX B.7

Air Quality Data From O_3, O_x, SO_2, H_2S and NO_2 Instruments, Daily Averages

MOBILE VAN LOCATION = LOS ANGELES, CALIFORNIA

SEP 1970

TIME DAY (PCT)		************ OZONE (PPM) ************				* OXIDANT (PPM) *		****************** SO2 (PPM) ******************				
		CHEM	GAS PH	COUL	COLOR	COUL	COLOR	COLOR	FPD	COUL	COND	GC-FPD
0-23	4	.0189	9.9999	.0296	.0966	.0238	.1018	-.0013	-.0002	9.9999	.0451	.0045
0-23	5	.0363	9.9999	.0297	.1019	.0298	.1059	-.0029	.0019	9.9999	.0347	.0020
0-23	6	.0343	9.9999	.0410	.1431	.0286	.1409	.0018	.0069	9.9999	.0529	.0070
0-23	7	.0246	9.9999	.0274	.0824	.0162	.0784	.0012	.0058	9.9999	.0470	.0059
0-23	8	.0079	9.9999	.0162	.0112	.0063	.0098	.0138	.0105	9.9999	.0544	.0064
0-23	9	.0172	9.9999	.0227	.0187	.0113	.0187	.0021	.0118	.0196	.0628	.0080
0-23	10	.0295	9.9999	.0409	.0410	.0237	.0361	-.0001	.0173	.0268	.0659	.0127
0-23	11	.0295	9.9999	.0435	-.1226	.0248	-.1292	.0026	.0191	.0282	.0632	.0152
0-23	12	.0326	9.9999	.0358	-.1340	.0251	-.1481	.0011	.0098	.0104	.0285	.0077
0-23	13	.0175	9.9999	.0172	.0051	.0121	.0036	.0028	.0063	.0092	.0122	.0076
0-23	14	.0217	.0151	.0146	-.0066	.0173	-.0003	.0022	.0025	.0050	.0111	.0046
0-23	15	.0276	.0158	.0283	.0098	.0245	.0155	.0037	.0075	.0173	.0220	.0068
0-23	16	.0402	.0351	.0339	.0114	.0332	.0267	.0075	.0137	.0236	.0321	.0124
0-23	17	.0349	.0320	9.9999	9.9999	.0303	.0091	.0139	.0166	.0292	.0336	.0125
0-23	18	.0385	.0305	9.9999	9.9999	.0348	9.9999	.0044	.0076	.0148	.0253	.0067
0-23	19	.0346	.0223	9.9999	9.9999	.0309	9.9999	9.9999	9.9999	.0184	.0302	.0111
0-23	20	.0318	.0335	9.9999	9.9999	.0300	9.9999	9.9999	9.9999	.0151	.0207	.0123
0-23	21	.0356	.0265	9.9999	9.9999	.0268	.0596	.0020	9.9999	.0124	.0154	.0081
0-23	22	.0261	.0200	9.9999	9.9999	.0241	.0780	.0105	9.9999	.0233	.0402	.0132
0-23	23	.0267	.0277	.0390	.0725	.0247	.0762	.0241	.0173	.0266	.0359	.0168
0-23	24	.0336	.0287	.0270	.0609	.0245	.0789	9.9999	.0183	.0207	9.9999	.0115
0-23	25	.0455	.0142	.0216	.0390	.0463	.0828	9.9999	.0160	.0277	9.9999	.0105
0-23	26	.0276	.0307	9.9999	.0610	9.9999	.0616	.0184	.0175	.0343	9.9999	.0128
0-23	27	.0251	.0328	9.9999	.0365	9.9999	.0457	9.9999	.0072	.0172	9.9999	.0054

		*** H2S (PPM) ***		AVERAGE	NO2(PPM)	SOLAR RADIATION (LANGLEYS)	**** WIND *****		TEMP (DEG C)		AVERAGE
		GC-FPD	COLOR	OX(PPM)	COLOR		DIRECT (DEG)	SPEED (MPH)	AMB OUT	DEW POINT	SO2(PPM)
0-23	4	.0013	9.9999	.0628	.1040	.50	259.4	5.2	19.66	12.36	.0118
0-23	5	.0014	9.9999	.0678	.0492	.33	217.8	4.4	19.51	11.58	.0089
0-23	6	.0009	9.9999	.0924	.0903	.34	344.1	3.7	22.85	9.44	.0185
0-23	7	.0018	9.9999	.0473	.0693	.33	239.1	3.7	20.90	14.65	.0154
0-23	8	.0017	9.9999	.0080	.0897	.32	259.1	3.8	20.01	14.07	.0207
0-23	9	.0017	9.9999	.0150	.1132	.31	263.0	3.6	20.51	13.93	.0210
0-23	10	.0021	9.9999	.0299	.1029	.31	248.3	3.2	21.82	14.55	.0245
0-23	11	.0021	9.9999	-.0522	.1154	.30	250.2	3.7	21.54	14.95	.0257
0-23	12	.0016	9.9999	-.0496	.0325	.21	220.9	5.0	19.74	14.68	.0121
0-23	13	.0012	9.9999	.0062	.0364	.21	280.2	4.8	18.51	11.98	.0076
0-23	14	.0002	9.9999	.0085	.0574	.29	268.1	4.4	18.42	10.99	.0051
0-23	15	-.0000	9.9999	.020[illegible]	.1040	.30	318.0	3.4	19.01	11.27	.0121
0-23	16	.0006	9.9999	.030[illegible]	.1435	.30	314.7	2.9	21.06	11.69	.0189
0-23	17	.0018	9.9999	.019[illegible]	9.9999	.28	282.5	3.2	20.78	12.99	.0214
0-23	18	.0021	.0014	[illegible]	9.9999	.30	270.6	3.7	19.79	12.94	.0119
0-23	19	.0023	.0005	.0309	9.9999	.31	253.0	3.3	18.95	11.93	.0197
0-23	20	.0025	-.0005	.0344	9.9999	.30	202.1	3.4	19.57	11.66	.0157
0-23	21	.0019	-.0003	.0406	9.9999	.28	228.2	3.7	19.94	13.18	.0095
0-23	22	.0024	.0001	.0493	9.9999	.29	11.9	3.3	24.36	7.65	.0222
0-23	23	.0014	.0019	.0505	.1170	.29	277.5	3.8	23.80	3.63	.0241
0-23	24	.0019	.0044	.0517	.1281	.27	235.4	3.5	22.04	13.64	.0171
0-23	25	.0017	.0051	.0652	.1458	.27	178.8	2.7	26.34	6.36	.0175
0-23	26	.0015	.0054	.0594	.1308	.30	17.6	3.5	26.43	-2.18	.0210
0-23	27	.0000	.0066	.0457	.0384	.28	62.7	4.1	28.88	-.96	.0099

NOT REPRODUCIBLE

9345

MOBILE VAN LOCATION = LOS ANGELES; CALIFORNIA

SEP 1970

TIME DAY (PCT)	************ OZONE (PPM) ************				* OXIDANT (PPM) *		****************** SO2 (PPM) ******************				
	CHEM	GAS PH	COUL	COLOR	COUL	COLOR	COLOR	FPD	COUL	COND	GC-FPD
0-23 28	.0055	.0030	9.9999	.0236	9.9999	.0279	9.9999	.0084	.0242	9.9999	.0065
0-23 29	.0224	.0123	.0307	.0692	.0260	.0766	9.9999	.0077	.0155	9.9999	.0113
0-23 30	.0356	.0168	.0283	9.9999	.0329	9.9999	.0021	.0125	.0308	.0165	.0122

	*** H2S (PPM) ***		AVERAGE	NO2(PPM)	SOLAR RADIATION (LANGLEYS)	**** WIND *****		TEMP (DEG C)		AVERAGE
	GC-FPD	COLOR	OX(PPM)	COLOR		DIRECT (DEG)	SPEED (MPH)	AMB OUT	DEW POINT	SO2(PPM)
0-23 28	.0007	.0507	.0216	.1015	.26	23.5	4.3	27.73	.78	.0131
0-23 29	.0015	9.9999	.0513	.1145	.29	294.0	4.6	27.23	6.33	.0140
0-23 30	.0028	.0114	.0434	.1560	.24	6.3	3.3	24.72	8.95	.0155

NOT REPRODUCIBLE

MOBILE VAN LOCATION = LOS ANGELES, CALIFORNIA

OCT 1970

TIME DAY (PCT)		************ OZONE (PPM) ************				* OXIDANT (PPM) *		****************** SO2 (PPM) ******************				
		CHEM	GAS PH	COUL	COLOR	COUL	COLOR	COLOR	FPD	COUL	COND	GC-FPD
0-23	1	.0539	.0414	9.9999	9.9999	.0517	9.9999	9.9999	.0147	.0421	.0251	.0181
0-23	2	.0301	.0268	9.9999	9.9999	.0246	9.9999	9.9999	.0192	.0562	.0284	.0223
0-23	3	.0321	.0226	.0371	.0380	.0202	.0337	9.9999	.0168	.0315	.0163	.0214
0-23	4	.0341	.0234	.0291	.0305	.0287	.0401	-.0009	.0114	.0125	.0038	.0042
0-23	5	.0152	.0097	.0145	.0129	.0119	.0184	.0004	.0129	.0159	.0041	.0057
0-23	6	.0166	.0118	.0162	.0168	.0128	.0187	-.0016	.0119	.0141	.0025	.0049
0-23	7	.0236	.0188	.0211	.0144	.0182	.0167	-.0031	.0117	.0150	.0000	.0054
0-23	8	.0181	.0178	.0217	.0168	.0211	.0269	-.0013	.0118	.0145	.0001	.0080
0-23	9	.0213	.0205	.0259	.0251	.0218	.0323	.0073	.0146	.0122	.0031	.0158
0-23	10	.0436	.0336	.0375	.0421	.0334	.0474	.0073	.0149	.0098	.0025	.0131
0-23	11	.0426	.0328	.0405	.0450	.0364	.0500	.0097	.0151	.0071	.0022	.0127
0-23	12	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999
0-23	13	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999	9.9999
0-23	14	.0134	.0117	9.9999	9.9999	.0101	9.9999	9.9999	.0101	.0004	0.0000	.0065
0-23	15	.0221	.0204	9.9999	9.9999	.0184	9.9999	9.9999	.0084	.0081	0.0000	.0070
0-23	16	.0240	.0271	9.9999	9.9999	.0257	9.9999	9.9999	.0080	.0058	.0003	.0057
0-23	17	.0446	.0381	.0416	.0548	.0372	.0584	9.9999	.0117	.0086	.0086	.0070
0-23	18	.0471	.0370	.0482	.0643	.0357	.0614	9.9999	.0161	.0190	.0229	.0137
0-23	19	.0325	.0240	.0243	.0355	.0236	.0443	9.9999	.0129	.0128	.0118	.0099
0-23	20	.0156	.0110	.0136	.0234	.0124	.0288	.0011	.0058	.0063	.0054	.0068
0-23	21	.0044	.0034	.0085	9.9999	.0031	9.9999	.0084	.0048	.0140	.0107	.0112
0-23	22	.0065	.0066	.0094	9.9999	.0060	9.9999	.0114	-.0019	.0119	.0081	.0123
0-23	23	.0039	.0031	9.9999	9.9999	.0040	9.9999	9.9999	-.0018	.0100	.0070	.0120
0-23	24	.0099	.0093	9.9999	9.9999	.0087	.0231	9.9999	-.0033	.0091	.0042	.0086

		*** H2S (PPM) ***		AVERAGE	NO2(PPM)	SOLAR RADIATION (LANGLEYS)	**** WIND *****		TEMP (DEG C)		AVERAGE
		GC-FPD	COLOR	OX(PPM)	COLOR		DIRECT (DEG)	SPEED (MPH)	AMB OUT	DEW POINT	SO2(PPM)
0-23	1	.0026	9.9999	.0517	9.9999	.25	73.1	2.8	23.99	8.61	.0237
0-23	2	.0030	9.9999	.0264	9.9999	.21	208.7	3.2	23.97	13.46	.0322
0-23	3	.0027	9.9999	.0270	.1133	.15	238.2	3.2	23.60	15.86	.0233
0-23	4	.0014	9.9999	.0344	.0959	.23	255.7	3.8	22.70	15.42	.0062
0-23	5	0.0000	9.9999	.0151	.0621	.12	259.6	4.4	19.79	14.09	.0078
0-23	6	0.0000	9.9999	.0157	.0503	.06	256.4	4.9	19.02	13.45	.0064
0-23	7	.0000	9.9999	.0172	.0488	.24	273.2	4.5	19.08	11.88	.0059
0-23	8	.0002	9.9999	.0240	.1013	.26	40.9	3.3	20.70	4.79	.0066
0-23	9	.0015	9.9999	.0265	.1091	.26	312.0	3.6	21.02	5.04	.0106
0-23	10	.0017	9.9999	.0404	.0904	.26	282.8	3.1	19.94	11.15	.0095
0-23	11	.0027	9.9999	.0432	.0868	.24	234.7	2.9	21.93	13.80	.0094
0-23	12	9.9999	9.9999	9.9999	9.9999	.16	259.5	3.5	19.69	13.41	9.9999
0-23	13	9.9999	9.9999	9.9999	.0672	.18	248.7	3.8	19.00	12.30	9.9999
0-23	14	.0022	9.9999	.0102	.0639	.15	284.4	4.1	18.45	11.42	.0043
0-23	15	.0024	9.9999	.0184	9.9999	.18	344.4	3.5	17.53	10.81	.0059
0-23	16	.0020	9.9999	.0301	9.9999	.20	275.4	3.6	18.70	12.43	.0050
0-23	17	.0023	9.9999	.0478	.0761	.21	257.9	3.2	18.98	12.50	.0090
0-23	18	.0028	9.9999	.0485	.0909	.19	222.7	2.6	18.92	12.50	.0179
0-23	19	.0024	9.9999	.0340	.0770	.20	241.0	3.6	18.77	12.30	.0110
0-23	20	.0028	9.9999	.0206	.0634	.17	211.1	4.3	18.19	11.36	.0051
0-23	21	.0028	9.9999	.0054	.0705	.15	218.7	4.0	17.18	10.94	.0098
0-23	22	.0020	9.9999	.0060	.0712	.17	163.4	3.6	17.22	10.12	.0076
0-23	23	.0018	9.9999	.0069	9.9999	.13	5.2	4.7	17.22	10.78	.0068
0-23	24	.0020	.0004	.0159	9.9999	.15	232.4	3.0	18.20	11.55	.0047

NOT REPRODUCIBLE

9393

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MOBILE VAN LOCATION =  LOS ANGELES, CALIFORNIA                                                          OCT 1970

            ************* OZONE (PPM) *************    * OXIDANT (PPM) *    ******************** SO2 (PPM) ********************
TIME DAY
(PCT)        CHEM      GAS PH      COUL      COLOR       COUL      COLOR       COLOR       FPD       COUL       COND      GC-FPD

0-23 25     .0171      .0159      9.9999    9.9999      .0141      .0294      9.9999     -.0055     .0119      .0056      .0145
0-23 26     .0077      .0067      9.9999    9.9999      .0095      .0315      9.9999      .0012     .0185      .0109      .0167
0-23 27     .0092      .0100      9.9999    9.9999      .0083      .0286       .0177      .0113     .0293      .0209      .0192
0-23 28     .0054      .0045       .0177     .0171      .0064      .0143       .0199      .0051     .0244      .0143      .0170
0-23 29     .0042      .0059       .0224     .0360      .0094      .0357       .0267      .0077     .0285      .0172     9.9999
0-23 30     .0136      .0142       .0362     .0580      .0140      .0520       .0427      .0180     .0420      .0314      .0133
0-23 31     .0257      .0255       .0361     .0626      .0253      .0630       .0355      .0057     .0243      .0176      .0026

            *** H2S (PPM) ***    AVERAGE    NO2(PPM)      SOLAR       **** WIND *****              TEMP (DEG C)     AVERAGE
                                                         RADIATION    DIRECT    SPEED              AMB      DEW
            GC-FPD     COLOR     OX(PPM)     COLOR      (LANGLEYS)    (DEG)     (MPH)              OUT      POINT     SO2(PPM)
0-23 25     .0023      .0005      .0217     9.9999        .22          75.8      3.1              16.54     8.20      .0066
0-23 26     .0026      .0016      .0205     9.9999        .22          25.0      3.0              15.70     5.38      .0121
0-23 27     .0033      .0057      .0185     9.9999        .22         342.0      4.1              18.41    -4.39      .0197
0-23 28     .0031      .0061      .0110      .0942        .20          71.0      2.3              19.13    -6.91      .0162
0-23 29    9.9999      .0104      .0225      .1202        .20          43.8      2.9              20.52    -4.42      .0202
0-23 30     .0071      .0136      .0330      .1539        .19          85.5      2.6              18.38     1.72      .0315
0-23 31     .0059      .0152      .0441      .1062        .22         295.2      2.7              18.09     4.78      .0171
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NOT REPRODUCIBLE

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        MOBILE VAN LOCATION =  LOS ANGELES; CALIFORNIA                                                          NOV 1970

               ************ OZONE (PPM) ************     * OXIDANT (PPM) *    ****************** SO2 (PPM) ******************
TIME DAY
(PCT)      CHEM      GAS PH     COUL      COLOR        COUL      COLOR       COLOR      FPD       COUL      COND     GC-FPD

0-23  1   .0421     .0391     .0557     .0811        .0381     .0777       .0480     .0106     .0323     .0274     .0099
0-23  2   .0144     .0150    9.9999    9.9999        .0137    9.9999      9.9999     .0123     .0283     .0208     .0075
0-23  3   .0046     .0045    9.9999    9.9999        .0074    9.9999      9.9999     .0107     .0261     .0191     .0052
0-23  4   .0067     .0069     .0132     .0286        .0036     .0284      9.9999     .0091     .0221     .0131     .0105
0-23  5   .0024     .0032     .0105     .0226        .0018     .0204       .0129     .0071     .0177     .0117     .0107
0-23  6   .0019     .0025     .0041     .0088        .0023     .0099       .0060     .0010     .0022     .0017     .0063
0-23  7   .0058     .0063     .0050     .0171        .0071     .0230       .0035    -.0014    -.0052     .0002     .0034
0-23  8   .0111     .0113     .0122     .0324        .0133     .0407       .0064     .0020    -.0006     .0028     .0050
0-23  9   .0084     .0100     .0122     .0355        .0113     .0421       .0093     .0031     .0004     .0056     .0077
0-23 10   .0049     .0103     .0165    9.9999        .0107     .0551       .0164     .0097     .0058     .0146     .0222
0-23 11  9.9999     .0101     .0178    9.9999        .0091    9.9999       .0162     .0126     .0034     .0190     .0259
0-23 12   .0036     .0042     .0156    9.9999        .0044    9.9999       .0215     .0116    -.0014     .0213     .0264
0-23 13   .0082     .0074     .0238     .0127        .0080     .0872       .0311     .0151     .0180     .0304     .0412
0-23 14   .0019     .0017    9.9999    9.9999        .0034    9.9999      9.9999     .0082     .0055     .0179     .0290
0-23 15   .0107     .0092     .0050     .0178        .0103     .0296      9.9999    -.0023    -.0201     .0023     .0136
0-23 16  9.9999    9.9999    9.9999    9.9999       9.9999    9.9999      9.9999    9.9999    9.9999    9.9999    9.9999
0-23 17   .0109     .0129     .0260    9.9999        .0219    9.9999      9.9999     .0053     .0080     .0153     .0299
0-23 18   .0095     .0084     .0173     .0421        .0083     .0508      9.9999     .0162     .0153     .0225     .0235
0-23 19   .0104     .0103     .0195     .0187        .0137     .0249       .0128     .0109    -.0022     .0233     .0144
0-23 20   .0103     .0103     .0157     .0128        .0130     .0201       .0083     .0064    -.0074     .0232     .0118
0-23 21   .0110     .0104     .0142     .0134        .0123     .0191       .0058     .0027    -.0077     .0207     .0090
0-23 22   .0149     .0139     .0182     .0147        .0175     .0204       .0035    -.0012    -.0055     .0188     .0061
0-23 23   .0093     .0095     .0214     .0262        .0156     .0315       .0083     .0050     .0094     .0303     .0062
0-23 24   .0024     .0030     .0285     .0370        .0066     .0323       .0244     .0254    9.9999     .0516     .0260

          *** H2S (PPM) ***   AVERAGE   NO2(PPM)     SOLAR      **** WIND *****             TEMP (DEG C)     AVERAGE
                                                   RADIATION    DIRECT    SPEED              AMB       DEW
           GC-FPD    COLOR    OX(PPM)    COLOR    (LANGLEYS)    (DEG)     (MPH)              OUT      POINT    SO2(PPM)
0-23  1    .0067     .0174     .0579     .1351       .21        164.9      2.2              18.90      7.27     .0257
0-23  2    .0028    9.9999     .0167    9.9999       .18        257.9      3.0              25.21     11.58     .0201
0-23  3    .0012    9.9999     .0138    9.9999       .17        260.0      3.3              22.36     10.91     .0153
0-23  4    .0022    9.9999     .0160     .0705       .11        240.8      2.7              17.79     10.37     .0135
0-23  5    .0048    9.9999     .0111     .0625       .11        233.4      2.7              21.26     12.35     .0125
0-23  6    .0045     .0079     .0061     .0271       .12        262.8      5.0              29.34     13.26     .0034
0-23  7    .0045     .0145     .0151     .0366       .20        260.3      3.8              18.89      9.44     .0001
0-23  8    .0055     .0247     .0270     .0695       .22         46.3      2.5              18.05      6.31     .0031
0-23  9    .0069     .0337     .0267     .0715       .19         52.9      3.1              19.39      5.05     .0052
0-23 10    .0073     .0431     .0220     .0988       .18        285.3      3.0              21.86     10.05     .0138
0-23 11    .0073     .0529     .0091     .1126       .15        229.7      2.6              20.23     11.44     .0154
0-23 12    .0082     .0606     .0042     .0829       .16        169.0      4.2              18.54      9.84     .0161
0-23 13    .0039     .0658     .0081     .1090       .19         79.3      2.8              19.36       .30     .0272
0-23 14    .0078    9.9999     .0071    9.9999       .16         79.6      3.1              19.91     -3.44     .0151
0-23 15    .0068    9.9999     .0200     .0556       .22         69.2      3.4              19.95     -4.95    -.0016
0-23 16   9.9999    9.9999    9.9999    9.9999     99.99        999.9    999.9             999.99    999.99    9.9999
0-23 17    .0052    9.9999     .0479     .1973       .23        264.4      2.2              20.52      5.92     .0149
0-23 18    .0003    9.9999     .0296     .1669       .15        145.4      2.4              17.97      8.26     .0204
0-23 19    .0044    9.9999     .0190     .1091       .16        121.1      2.6              20.29      9.52     .0115
0-23 20    .0064     .0002     .0163     .0945       .15        221.7      3.1              17.38      9.67     .0085
0-23 21    .0039     .0019     .0157     .0714       .12         18.8      3.2              15.96      8.38     .0061
0-23 22    .0042    -.0016     .0189     .0607       .15         12.0      2.6              15.49      8.10     .0043
0-23 23    .0059    -.0043     .0235     .1052       .17         40.4      2.6              17.22      6.73     .0121
0-23 24    .0041    -.0014     .0188     .1509       .15        178.5      3.2              16.83      8.45     .0370
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MOBILE VAN LOCATION = LOS ANGELES, CALIFORNIA

NOV 1970

TIME DAY (PST)	************ OZONE (PPM) ************				* OXIDANT (PPM) *		****************** SO2 (PPM) ******************				
	[illegible]	GAS PH	COUL	COLOR	COUL	COLOR	COLOR	FPD	COUL	COND	GC-FPD
0-23 25	.0174	.0161	.0220	.0331	.0171	.0357	.0040	.0018	.0168	.0147	.0074
0-23 26	.0081	.0072	.0075	.0176	.0101	.0244	-.0011	-.0053	.0015	.0034	.0003
0-23 27	.0045	.0041	.0078	.0109	.0051	.0129	.0012	-.0056	.0160	.0060	.0097
0-23 28	.0049	.0042	.0051	.0073	.0068	.0118	.0001	-.0085	.0020	.0015	.0042
0-23 29	.0069	.0061	.0065	.0091	.0084	.0133	.0017	-.0085	.0002	-.0003	.0033
0-23 30	.0032	.0022	.0018	.0047	.0055	.0139	.0016	-.0085	-.0036	.0030	9.9999

	*** H2S (PPM) ***		AVERAGE	NO2(PPM)	SOLAR RADIATION (LANGLEYS)	**** WIND *****		TEMP (DEG C)		AVERAGE
	GC-FPD	COLOR	OX(PPM)	COLOR		DIRECT (DEG)	SPEED (MPH)	AMB OUT	DEW POINT	SO2(PPM)
0-23 25	.0056	.0003	.0255	.0684	.04	111.6	2.4	23.16	9.68	.0091
0-23 26	.0066	.0020	.0173	.0396	.17	267.6	5.5	26.68	10.13	-.0003
0-23 27	.0103	.0027	.0089	.0423	.15	150.8	4.1	15.00	5.85	.0055
0-23 28	.0104	.0023	.0093	.0265	.05	115.6	6.8	21.81	7.64	-.0002
0-23 29	.0120	.0026	.0107	.0195	.02	193.5	8.2	26.01	10.18	-.0011
0-23 30	9.9999	.0013	.0060	.0482	.09	104.7	6.9	13.61	7.82	-.0037

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MOBILE VAN LOCATION =  LOS ANGELES, CALIFORNIA                                                    DEC 1970

           ************ OZONE (PPM) ************     * OXIDANT (PPM) *     ****************** SO2 (PPM) *****************
TIME DAY
(PCT)        CHEM     GAS PH      COUL      COLOR        COUL      COLOR        COLOR      FPD       COUL       COND      GC-FPD

0-23  1   9.9999     9.9999     9.9999     9.9999       9.9999    9.9999       9.9999    9.9999    9.9999     9.9999     9.9999

          *** H2S (PPM) ***    AVERAGE    NO2(PPM)      SOLAR      **** WIND *****                    TEMP (DEG C)       AVERAGE
                                                      RADIATION    DIRECT    SPEED                   AMB        DEW
           GC-FPD     COLOR    OX(PPM)     COLOR      (LANGLEYS)    (DEG)    (MPH)                   OUT       POINT     SO2(PPM)
0-23  1   9.9999     9.9999    9.9999     9.9999        99.99       999.9    999.9                 999.99     999.99     9.9999
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APPENDIX C

INSTRUMENT CORRELATION

The following tables give the correlation between the output of similar instruments for each week of the Los Angeles study. The data used are the hourly averages after continuous drift correction. (Correlations before drift correction are included in Copies 1-4 of the report). The terms FLD 1 and FLD 2 in the tables are the outputs being correlated. N is the number of cases when both sets were available. AVG 1 and AVG 2 are the averages for the period. STD 1 and STD 2 are the staddard deviations about the average. CORREL is the statistical correlation coefficient.

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            STATISTICAL DATA FOR PERIOD    0600 SEP 4 THROUGH 0700 SEP 11
PAIR NO.       FLD 1              FLD 2            N     AVG1      STD1      AVG2      STD2     CORREL

   1        OZONE-CHEM       OZONE-GAS PH          0    9.9000    9.9000    9.9000    9.9000    0.0000
   2        OZONE-CHEM        OZONE(T)            51     .0301     .0314     .1134     .0422     .8519
   3        OZONE-CHEM        OZONE(M)           155     .0224     .0304     .0288     .0290     .9210
   4       OZONE-GAS PH       OZONE(T)             0    9.9000    9.9000    9.9000    9.9000    0.0000
   5       OZONE-GAS PH       OZONE(M)             0    9.9000    9.9000    9.9000    9.9000    0.0000
   6         OZONE(T)         OZONE(M)            51     .1134     .0422     .0342     .0334     .8512
   7        H2S-GC-FPD        H2S-COLOR            0    9.9000    9.9000    9.9000    9.9000    0.0000
   8        SO2-COLOR          SO2-FPD           164     .0021     .0084     .0083     .0081     .2849
   9        SO2-COLOR          SO2-COUL           62     .0030     .0106     .0216     .0151    -.1811
  10        SO2-COLOR          SO2-COND          164     .0021     .0084     .0520     .0267     .2804
  11        SO2-COLOR        SO2-GC-FPD          143     .0024     .0089     .0068     .0062     .1932
  12         SO2-FPD           SO2-COUL           62     .0122     .0088     .0216     .0151     .7992
  13         SO2-FPD           SO2-COND          165     .0083     .0081     .0519     .0266     .7273
  14         SO2-FPD         SO2-GC-FPD          143     .0088     .0085     .0068     .0062     .8809
  15         SO2-COUL          SO2-COND           62     .0216     .0151     .0567     .0235     .9897
  16         SO2-COUL        SO2-GC-FPD           62     .0216     .0151     .0090     .0072     .8748
  17         SO2-COND        SO2-GC-FPD          143     .0542     .0274     .0068     .0062     .7489
  18         OX-COUL          OZONE-CHEM         168     .0188     .0239     .0234     .0303     .9169
  19         OX-COUL         OZONE-GAS PH          0    9.9000    9.9000    9.9000    9.9000    0.0000
  20         OX-COUL          OX-COLOR            54     .0293     .0276     .1158     .0356     .7273
```

STATISTICAL DATA FOR PERIOD 0800 SEP 11 THROUGH 0800 SEP 18

PAIR NO.	FLD 1	FLD 2	N	AVG1	STD1	AVG2	STD2	CORREL
1	OZONE-CHEM	OZONE-GAS PH	111	.0272	.0418	.0233	.0378	.9900
2	OZONE-CHEM	OZONE(T)	104	.0221	.0316	.0074	.0270	.8740
3	OZONE-CHEM	OZONE(M)	133	.0250	.0325	.0294	.0313	.9608
4	OZONE-GAS PH	OZONE(T)	83	.0172	.0311	.0027	.0267	.8970
5	OZONE-GAS PH	OZONE(M)	83	.0172	.0311	.0240	.0308	.9626
6	OZONE(I)	OZONE(M)	103	.0069	.0266	.0240	.0283	.9813
7	H2S-GC-EPD	H2S-COLOR	18	.0016	.0006	.0002	.0011	-.4302
8	SO2-COLOR	SO2-FPD	153	.0049	.0102	.0101	.0103	.7707
9	SO2-COLOR	SO2-COUL	151	.0050	.0103	.0165	.0144	.7133
10	SO2-COLOR	SO2-COND	153	.0049	.0102	.0270	.0224	.5472
11	SO2-COLOR	SO2-GC-FPD	153	.0044	.0083	.0092	.0088	.7488
12	SO2-FPD	SO2-COUL	159	.0107	.0109	.0171	.0147	.8909
13	SO2-FPD	SO2-COND	162	.0106	.0108	.0277	.0225	.8986
14	SO2-FPD	SO2-GC-FPD	160	.0100	.0093	.0093	.0087	.8519
15	SO2-COUL	SO2-COND	159	.0171	.0147	.0278	.0227	.8843
16	SO2-COUL	SO2-GC-FPD	158	.0165	.0138	.0094	.0088	.7529
17	SO2-COND	SO2-GC-FPD	160	.0270	.0215	.0093	.0087	.7590
18	OX-COUL	OZONE-CHEM	163	.0240	.0289	.0286	.0383	.9752
19	OX-COUL	OZONE-GAS PH	111	.0239	.0312	.0233	.0378	.9668
20	OX-COUL	OX-COLOR	131	.0228	.0295	.0118	.0249	.8210

STATISTICAL DATA FOR PERIOD 0900 SEP 18 THROUGH 0800 SEP 25

PAIR NO.	FLD 1	FLD 2	N	AVG1	STD1	AVG2	STD2	CORREL
1	OZONE-CHEM	OZONE-GAS PH	154	.0316	.0479	.0275	.0398	.9891
2	OZONE-CHEM	OZONE(T)	59	.0239	.0449	.0633	.0665	.9579
3	OZONE-CHEM	OZONE(M)	59	.0239	.0449	.0307	.0359	.9637
4	OZONE-GAS PH	OZONE(T)	59	.0214	.0382	.0633	.0665	.9663
5	OZONE-GAS PH	OZONE(M)	59	.0214	.0382	.0307	.0359	.9728
6	OZONE(T)	OZONE(M)	59	.0633	.0665	.0307	.0359	.9553
7	H2S-GC-FPD	H2S-COLOR	147	.0020	.0011	.0014	.0021	-.1979
8	SO2-COLOR	SO2-FPD	65	.0147	.0133	.0129	.0096	.8917
9	SO2-COLOR	SO2-COUL	107	.0109	.0122	.0183	.0123	.7929
10	SO2-COLOR	SO2-COND	99	.0106	.0125	.0259	.0190	.7724
11	SO2-COLOR	SO2-GC-FPD	107	.0109	.0122	.0109	.0058	.8631
12	SO2-FPD	SO2-COUL	88	.0145	.0101	.0209	.0140	.8234
13	SO2-FPD	SO2-COND	58	.0127	.0101	.0311	.0202	.8249
14	SO2-FPD	SO2-GC-FPD	88	.0145	.0101	.0118	.0066	.7946
15	SO2-COUL	SO2-COND	129	.0190	.0131	.0287	.0222	.8680
16	SO2-COUL	SO2-GC-FPD	157	.0192	.0133	.0114	.0064	.8334
17	SO2-COND	SO2-GC-FPD	127	.0282	.0219	.0117	.0066	.8477
18	OX-COUL	OZONE-CHEM	156	.0278	.0359	.0328	.0489	.9818
19	OX-COUL	OZONE-GAS PH	156	.0272	.0352	.0275	.0397	.9856
20	OX-COUL	OX-COLOR	102	.0253	.0347	.0696	.0579	.8920

STATISTICAL DATA FOR PERIOD 0900 SEP 25 THROUGH 0500 SEP 29

PAIR NO.	FLD 1	FLD 2	N	AVG1	STD1	AVG2	STD2	CORREL
1	OZONE-CHEM	OZONE-GAS PH	77	.0201	.0388	.0227	.0373	.9759
2	OZONE-CHEM	OZONE(T)	76	.0184	.0381	.0436	.0458	.9689
3	OZONE-CHEM	OZONE(M)	27	.0104	.0339	.0204	.0282	.9679
4	OZONE-GAS PH	OZONE(T)	74	.0207	.0368	.0439	.0463	.9214
5	OZONE-GAS PH	OZONE(M)	27	.0061	.0284	.0204	.0282	.9698
6	OZONE(T)	OZONE(M)	27	.0391	.0450	.0204	.0282	.9443
7	H2S-GC-FPD	H2S-COLOR	85	.0009	.0010	.0289	.0625	-.2582
8	SO2-COLOR	SO2-FPD	29	.0156	.0065	.0159	.0072	.8896
9	SO2-COLOR	SO2-COUL	29	.0156	.0065	.0299	.0166	.7899
10	SO2-COLOR	SO2-COND	0	9.9000	9.9000	9.9000	9.9000	0.0000
11	SO2-COLOR	SO2-GC-FPD	29	.0156	.0065	.0129	.0043	.7443
12	SO2-FPD	SO2-COUL	87	.0115	.0072	.0262	.0151	.8579
13	SO2-FPD	SO2-COND	0	9.9000	9.9000	9.9000	9.9000	0.0000
14	SO2-FPD	SO2-GC-FPD	85	.0117	.0072	.0091	.0049	.8958
15	SO2-COUL	SO2-COND	0	9.9000	9.9000	9.9000	9.9000	0.0000
16	SO2-COUL	SO2-GC-FPD	85	.0265	.0151	.0091	.0049	.7138
17	SO2-COND	SO2-GC-FPD	0	9.9000	9.9000	9.9000	9.9000	0.0000
18	OX-COUL	OZONE-CHEM	30	.0288	.0609	.0312	.0714	.9968
19	OX-COUL	OZONE-GAS PH	28	.0115	.0289	.0063	.0279	.9553
20	OX-COUL	OX-COLOR	30	.0288	.0609	.0653	.0862	.9859

STATISTICAL DATA FOR PERIOD 0600 SEP 29 THROUGH 0800 OCT 7

PAIR NO.	FLD 1	FLD 2	N	AVG1	STD1	AVG2	STD2	CORREL
1	OZONE-CHEM	OZONE-GAS PH	188	.0297	.0448	.0212	.0403	.9661
2	OZONE-CHEM	OZONE(T)	127	.0223	.0318	.0327	.0355	.7819
3	OZONE-CHEM	OZONE(M)	144	.0219	.0318	.0258	.0254	.9180
4	OZONE-GAS PH	OZONE(T)	128	.0144	.0229	.0325	.0354	.7112
5	OZONE-GAS PH	OZONE(M)	145	.0132	.0230	.0257	.0254	.9829
6	OZONE(T)	OZONE(M)	128	.0325	.0354	.0257	.0258	.8550
7	H2S-GC-FPD	H2S-COLOR	21	.0023	.0007	.0278	.0535	.0208
8	SO2-COLOR	SO2-FPD	126	.0003	.0074	.0122	.0028	.8849
9	SO2-COLOR	SO2-COUL	126	.0003	.0074	.0183	.0117	.7323
10	SO2-COLOR	SO2-COND	126	.0003	.0074	.0065	.0093	.6673
11	SO2-COLOR	SO2-GC-FPD	126	.0006	.0080	.0075	.0072	.8101
12	SO2-FPD	SO2-COUL	183	.0137	.0055	.0272	.0186	.7822
13	SO2-FPD	SO2-COND	180	.0137	.0055	.0135	.0183	.5569
14	SO2-FPD	SO2-GC-FPD	180	.0184	.0046	.0112	.0095	.8639
15	SO2-COUL	SO2-COND	180	.0271	.0187	.0135	.0183	.6782
16	SO2-COUL	SO2-GC-FPD	180	.0267	.0181	.0112	.0095	.8729
17	SO2-COND	SO2-GC-FPD	177	.0130	.0178	.0112	.0096	.6884
18	OX-COUL	OZONE-CHEM	184	.0261	.0370	.0289	.0441	.9561
19	OX-COUL	OZONE-GAS PH	185	.0260	.0369	.0207	.0401	.9670
20	OX-COUL	OX-COLOR	136	.0189	.0241	.0358	.0339	.7803

STATISTICAL DATA FOR PERIOD 0900 OCT 7 THROUGH 0700 OCT 14

PAIR NO.	FLD 1	FLD 2	N	AVG1	STD1	AVG2	STD2	CORREL
1	OZONE-CHEM	OZONE-GAS PH	131	.0281	.0388	.0236	.0310	.9874
2	OZONE-CHEM	OZONE(T)	122	.0296	.0397	.0286	.0403	.9553
3	OZONE-CHEM	OZONE(M)	130	.0283	.0388	.0278	.0326	.9806
4	OZONE-GAS PH	OZONE(T)	122	.0247	.0317	.0286	.0403	.9609
5	OZONE-GAS PH	OZONE(M)	131	.0237	.0309	.0277	.0324	.9889
6	OZONE(T)	OZONE(M)	122	.0286	.0403	.0290	.0333	.9673
7	H2S-GC-FPD	H2S-COLOR	0	9.9000	9.9000	9.9000	9.9000	0.0000
8	SO2-COLOR	SO2-FPD	120	.0056	.0091	.0140	.0028	.9163
9	SO2-COLOR	SO2-COUL	120	.0056	.0091	.0119	.0123	.4356
10	SO2-COLOR	SO2-COND	119	.0056	.0091	.0016	.0038	.5597
11	SO2-COLOR	SO2-GC-FPD	120	.0056	.0091	.0119	.0064	.8998
12	SO2-FPD	SO2-COUL	134	.0141	.0027	.0108	.0123	.3762
13	SO2-FPD	SO2-COND	133	.0141	.0027	.0014	.0036	.7014
14	SO2-FPD	SO2-GC-FPD	134	.0141	.0027	.0115	.0064	.8769
15	SO2-COUL	SO2-COND	133	.0187	.0123	.0014	.0036	.3443
16	SO2-COUL	SO2-GC-FPD	134	.0188	.0123	.0115	.0064	.5239
17	SO2-COND	SO2-GC-FPD	133	.0014	.0036	.0115	.0064	.6932
18	OX-COUL	OZONE-CHEM	130	.0244	.0313	.0283	.0388	.9758
19	OX-COUL	OZONE-GAS PH	131	.0243	.0312	.0237	.0309	.9850
20	OX-COUL	OX-COLOR	122	.0255	.0320	.0344	.0388	.9569

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          STATISTICAL DATA FOR PERIOD     0800 OCT 14 THROUGH 0700 OCT 21
PAIR NO.    FLD 1           FLD 2               N     AVG1     STD1     AVG2     STD2    CORREL

   1     OZONE-CHEM      OZONE-GAS PH          156   .0287    .0395    .0234    .0311    .9940
   2     OZONE-CHEM      OZONE(T)              108   .0306    .0435    .0417    .0413    .9822
   3     OZONE-CHEM      OZONE(M)              109   .0303    .0434    .0296    .0374    .9881
   4     OZONE-GAS PH    OZONE(T)              109   .0248    .0346    .0421    .0413    .9829
   5     OZONE-GAS PH    OZONE(M)              110   .0246    .0345    .0300    .0375    .9878
   6     OZONE(T)        OZONE(M)              109   .0421    .0413    .0302    .0376    .9966
   7     H2S-GC-FPD      H2S-COLOR               0   9.9000   9.9000   9.9000   9.9000   0.0000
   8     SO2-COLOR       SO2-FPD                41   .0022    .0056    .0077    .0058    .5846
   9     SO2-COLOR       SO2-COUL               41   .0022    .0056    .0087    .0074    .9597
  10     SO2-COLOR       SO2-COND               41   .0022    .0056    .0071    .0068    .8189
  11     SO2-COLOR       SO2-GC-FPD             41   .0022    .0056    .0079    .0043    .9386
  12     SO2-FPD         SO2-COUL              163   .0108    .0065    .0094    .0104    .8476
  13     SO2-FPD         SO2-COND              163   .0100    .0065    .0074    .0137    .7394
  14     SO2-FPD         SO2-GC-FPD            162   .0108    .0065    .0082    .0056    .8944
  15     SO2-COUL        SO2-COND              163   .0094    .0104    .0074    .0137    .6783
  16     SO2-COUL        SO2-GC-FPD            162   .0093    .0104    .0082    .0056    .9324
  17     SO2-COND        SO2-GC-FPD            162   .0074    .0137    .0082    .0056    .7787
  18     OX-COUL         OZONE-CHEM            156   .0229    .0288    .0287    .0395    .9927
  19     OX-COUL         OZONE-GAS PH          158   .0234    .0290    .0241    .0315    .9939
  20     OX-COUL         OX-COLOR              114   .0256    .0321    .0456    .0356    .9869
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STATISTICAL DATA FOR PERIOD   080Ø OCT 21 THROUGH 0900 OCT 28

PAIR NO.	FLD 1	FLD 2	N	AVG1	STD1	AVG2	STD2	CORREC
1	OZONE-CHEM	OZONE-GAS PH	166	.0083	.0147	.0082	.0144	.9896
2	OZONE-CHEM	OZONE(T)	19	.0008	.0033	.0110	.0058	.6700
3	OZONE-CHEM	OZONE(M)	65	.0037	.0073	.0100	.0085	.4921
4	OZONE-GAS PH	OZONE(T)	19	.0009	.0025	.0110	.0058	.6724
5	OZONE-GAS PH	OZONE(M)	65	.0036	.0072	.0100	.0085	.5161
6	OZONE(T)	OZONE(M)	19	.0110	.0058	.0145	.0041	.7403
7	H2S-GC-FPD	H2S-COLOR	110	.0025	.0009	.0025	.0028	.5591
8	SO2-COLOR	SO2-FPD	74	.0135	.0083	.0060	.0077	.9849
9	SO2-COLOR	SO2-COUL	74	.0135	.0083	.0210	.0130	.8908
10	SO2-COLOR	SO2-COND	74	.0135	.0083	.0151	.0106	.8895
11	SO2-COLOR	SO2-GC-FPD	73	.0135	.0084	.0158	.0114	.5879
12	SO2-FPD	SO2-COUL	166	.0009	.0081	.0155	.0114	.8382
13	SO2-FPD	SO2-COND	166	.0009	.0081	.0101	.0096	.9829
14	SO2-FPD	SO2-GC-FPD	164	.0009	.0081	.0138	.0147	.2872
15	SO2-COUL	SO2-COND	168	.0155	.0114	.0101	.0096	.9847
16	SO2-COUL	SO2-GC-FPD	164	.0155	.0114	.0138	.0147	.3723
17	SO2-COND	SO2-GC-FPD	164	.0100	.0096	.0138	.0147	.3776
18	OX-COUL	OZONE-CHEM	168	.0077	.0118	.0083	.0147	.9763
19	OX-COUL	OZONE-GAS PH	168	.0077	.0118	.0082	.0144	.9820
20	OX-COUL	OX-COLOR	116	.0090	.0133	.0253	.0171	.8662

STATISTICAL DATA FOR PERIOD 1000 OCT 28 THROUGH 0800 NOV 4

PAIR NO.	FLD 1	FLD 2	N	AVG1	STD1	AVG2	STD2	CORREL
1	OZONE-CHEM	OZONE-GAS PH	161	.0161	.0371	.0161	.0348	.9959
2	OZONE-CHEM	OZONE(T)	134	.0165	.0389	.0497	.0421	.9824
3	OZONE-CHEM	OZONE(M)	136	.0165	.0387	.0310	.0359	.9907
4	OZONE-GAS PH	OZONE(T)	134	.0163	.0363	.0497	.0421	.9133
5	OZONE-GAS PH	OZONE(M)	136	.0164	.0361	.0310	.0359	.9994
6	OZONE(T)	OZONE(M)	134	.0497	.0421	.0310	.0361	.9824
7	H2S-GC-FPD	H2S-COLOR	93	.0054	.0031	.0143	.0036	.4138
8	SO2-COLOR	SO2-FPD	119	.0372	.0160	.0095	.0120	.8219
9	SO2-COLOR	SO2-COUL	119	.0372	.0160	.0304	.0166	.7349
10	SO2-COLOR	SO2-COND	118	.0374	.0160	.0216	.0174	.7804
11	SO2-COLOR	SO2-GC-FPD	93	.0381	.0172	.0100	.0136	.5812
12	SO2-FPD	SO2-COUL	167	.0101	.0118	.0293	.0165	.8858
13	SO2-FPD	SO2-COND	166	.0102	.0118	.0210	.0174	.9336
14	SO2-FPD	SO2-GC-FPD	141	.0097	.0125	.0087	.0137	.8146
15	SO2-COUL	SO2-COND	166	.0294	.0166	.0210	.0174	.8888
16	SO2-COUL	SO2-GC-FPD	141	.0277	.0161	.0087	.0137	.8568
17	SO2-COND	SO2-GC-FPD	140	.0201	.0182	.0087	.0137	.8840
18	OX-COUL	OZONE-CHEM	161	.0168	.0296	.0161	.0371	.9819
19	OX-COUL	OZONE-GAS PH	161	.0168	.0296	.0161	.0348	.9849
20	OX-COUL	OX-COLOR	134	.0171	.0353	.0481	.0395	.9251

STATISTICAL DATA FOR PERIOD 0900 NOV 4 THROUGH 1300 NOV 10

PAIR NO.	FLD 1	FLD 2	N	AVG1	STD1	AVG2	STD2	CORREL
1	OZONE-CHEM	OZONE-GAS PH	147	.0062	.0126	.0070	.0133	.9859
2	OZONE-CHEM	OZONE(T)	140	.0068	.0126	.0249	.0189	.7768
3	OZONE-CHEM	OZONE(M)	140	.0068	.0126	.0096	.0134	.8784
4	OZONE-GAS PH	OZONE(T)	140	.0067	.0133	.0249	.0189	.8098
5	OZONE-GAS PH	OZONE(M)	142	.0074	.0142	.0103	.0146	.9132
6	OZONE(T)	OZONE(M)	140	.0249	.0189	.0096	.0134	.9064
7	H2S-GC-FPD	H2S-COLOR	120	.0055	.0845	.0212	.0124	.6399
8	SO2-COLOR	SO2-FPD	144	.0089	.0089	.0035	.0062	.9482
9	SO2-COLOR	SO2-COUL	144	.0089	.0089	.0048	.0131	.8862
10	SO2-COLOR	SO2-COND	144	.0089	.0089	.0060	.0097	.9372
11	SO2-COLOR	SO2-GC-FPD	140	.0085	.0084	.0086	.0090	.9126
12	SO2-FPD	SO2-COUL	145	.0037	.0065	.0052	.0136	.8433
13	SO2-FPD	SO2-COND	145	.0037	.0065	.0063	.0102	.9474
14	SO2-FPD	SO2-GC-FPD	141	.0035	.0062	.0088	.0092	.8830
15	SO2-COUL	SO2-COND	145	.0052	.0136	.0063	.0102	.8257
16	SO2-COUL	SO2-GC-FPD	141	.0046	.0131	.0088	.0092	.7813
17	SO2-COND	SO2-GC-FPD	141	.0058	.0097	.0088	.0092	.8866
18	OX-COUL	OZONE-CHEM	147	.0072	.0127	.0062	.0126	.9259
19	OX-COUL	OZONE-GAS PH	149	.0075	.0129	.0076	.0141	.9347
20	OX-COUL	OX-COLOR	147	.0072	.0127	.0300	.0226	.8249

STATISTICAL DATA FOR PERIOD 1400 NOV 10 THROUGH 2100 NOV 15

PAIR NO.	FLD 1	FLD 2	N	AVG1	STD1	AVG2	STD2	CORREL
1	OZONE-CHEM	OZONE-GAS PH	99	.0058	.0117	.0056	.0119	.9533
2	OZONE-CHEM	OZONE(T)	52	.0069	.0133	.0119	.0142	.7852
3	OZONE-CHEM	OZONE(M)	75	.0062	.0118	.0116	.0133	.5798
4	OZONE-GAS PH	OZONE(T)	52	.0056	.0114	.0119	.0142	.7209
5	OZONE-GAS PH	OZONE(M)	100	.0078	.0133	.0133	.0170	.7928
6	OZONE(I)	OZONE(M)	52	.0119	.0142	.0097	.0139	.6159
7	H2S-GC-FPD	H2S-COLOR	72	.0079	.0043	.0571	.0067	.2337
8	SO2-COLOR	SO2-FPD	71	.0199	.0116	.0117	.0094	.8369
9	SO2-COLOR	SO2-COUL	68	.0203	.0117	.0018	.0162	.8179
10	SO2-COLOR	SO2-COND	71	.0199	.0116	.0200	.0145	.8729
11	SO2-COLOR	SO2-GC-FPD	71	.0199	.0116	.0269	.0154	.9168
12	SO2-FPD	SO2-COUL	124	.0094	.0103	.0013	.0229	.8771
13	SO2-FPD	SO2-COND	127	.0093	.0102	.0178	.0159	.9353
14	SO2-FPD	SO2-GC-FPD	127	.0093	.0102	.0269	.0171	.9310
15	SO2-COUL	SO2-COND	124	.0013	.0229	.0178	.0161	.9819
16	SO2-COUL	SO2-GC-FPD	124	.0013	.0229	.0273	.0171	.9309
17	SO2-COND	SO2-GC-FPD	127	.0178	.0159	.0269	.0171	.9367
18	OX-COUL	OZONE-CHEM	99	.0064	.0107	.0058	.0117	.9550
19	OX-COUL	OZONE-GAS PH	124	.0071	.0140	.0067	.0143	.9483
20	OX-COUL	OX-COLOR	58	.0070	.0115	.0175	.0168	.7114

STATISTICAL DATA FOR PERIOD 0800 NOV 17 THROUGH 0700 NOV 27,1978

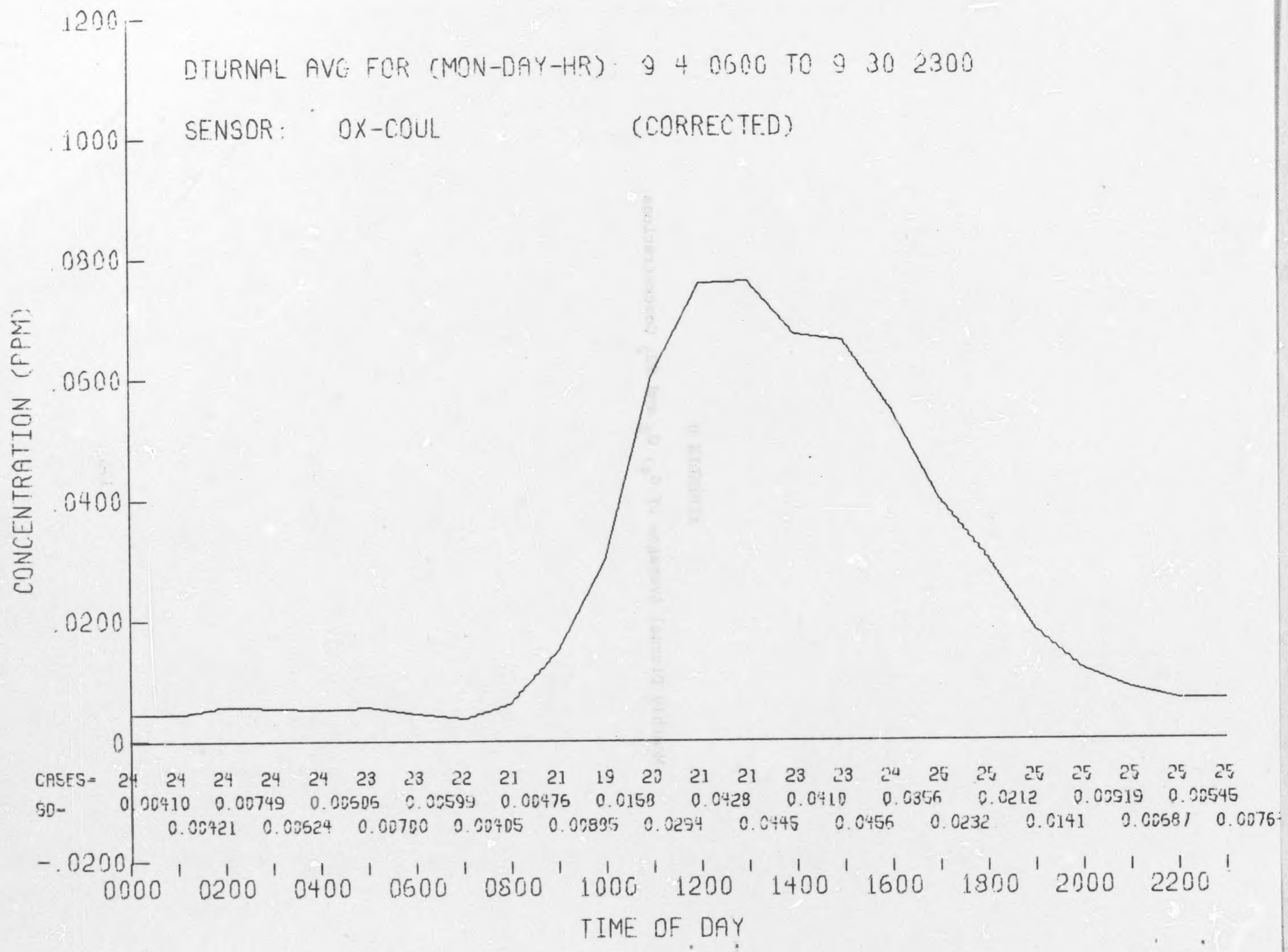
PAIR NO.	FLD 1	FLD 2	N	AVG1	STD1	AVG2	STD2	CORREL
1	OZONE-CHEM	OZONE-GAS PH	237	.0101	.0171	.0098	.0173	.9915
2	OZONE-CHEM	OZONE(T)	224	.0100	.0172	.0251	.0259	.5883
3	OZONE-CHEM	OZONE(M)	225	.0100	.0172	.0182	.0189	.8209
4	OZONE-GAS PH	OZONE(T)	224	.0096	.0174	.0251	.0259	.6277
5	OZONE-GAS PH	OZONE(M)	225	.0096	.0173	.0182	.0189	.8491
6	OZONE(I)	OZONE(M)	224	.0251	.0239	.0181	.0190	.8136
7	H2S-GC-FPD	H2S-COLOR	180	.0055	.0037	-.0003	.0025	.2865
8	SO2-COLOR	SO2-FPD	199	.0081	.0113	.0049	.0107	.9828
9	SO2-COLOR	SO2-COUL	188	.0075	.0153	.0047	.0209	.7836
10	SO2-COLOR	SO2-COND	197	.0080	.0113	.0205	.0152	.8362
11	SO2-COLOR	SO2-GC-FPD	197	.0076	.0103	.0095	.0083	.8540
12	SO2-FPD	SO2-COUL	216	.0053	.0122	.0066	.0238	.7479
13	SO2-FPD	SO2-COND	231	.0062	.0130	.0221	.0182	.8712
14	SO2-FPD	SO2-GC-FPD	232	.0058	.0119	.0125	.0122	.8074
15	SO2-COUL	SO2-COND	214	.0066	.0239	.0199	.0163	.6859
16	SO2-COUL	SO2-GC-FPD	214	.0060	.0232	.0121	.0119	.6701
17	SO2-COND	SO2-GC-FPD	229	.0217	.0178	.0125	.0123	.6339
18	OX-COUL	OZONE-CHEM	237	.0128	.0167	.0101	.0171	.9303
19	OX-COUL	OZONE-GAS PH	237	.0128	.0167	.0098	.0173	.9507
20	OX-COUL	OX-COLOR	238	.0129	.0169	.0307	.0275	.6868

STATISTICAL DATA FOR PERIOD 0800 NOV 27 THROUGH 0900 DEC 1, 1970

PAIR NO.	FLD 1	FLD 2	N	AVG1	STD1	AVG2	STD2	CORREL
1	OZONE-CHEM	OZONE-GAS PH	96	.0049	.0054	.0041	.0060	.9888
2	OZONE-CHEM	OZONE(T)	76	.0055	.0056	.0082	.0060	.8426
3	OZONE-CHEM	OZONE(M)	78	.0055	.0056	.0055	.0058	.8623
4	OZONE-GAS PH	OZONE(T)	78	.0049	.0062	.0082	.0060	.8761
5	OZONE-GAS PH	OZONE(M)	76	.0049	.0062	.0055	.0058	.8800
6	OZONE(I)	OZONE(M)	78	.0082	.0060	.0055	.0058	.9451
7	H2S-GC-FPD	H2S-COLOR	52	.0106	.0041	.0028	.0077	.0296
8	SO2-COLOR	SO2-FPD	77	.0011	.0036	-.0081	.0012	.1488
9	SO2-COLOR	SO2-COUL	77	.0011	.0036	.0029	.0078	.3979
10	SO2-COLOR	SO2-COND	77	.0011	.0036	.0019	.0042	.5938
11	SO2-COLOR	SO2-GC-FPD	52	.0008	.0017	.0048	.0026	.3853
12	SO2-FPD	SO2-COUL	96	-.0081	.0031	.0017	.0090	.3859
13	SO2-FPD	SO2-COND	88	-.0081	.0012	.0020	.0043	.2406
14	SO2-FPD	SO2-GC-FPD	53	-.0079	.0015	.0049	.0026	.8859
15	SO2-COUL	SO2-COND	88	.0030	.0079	.0020	.0043	.7672
16	SO2-COUL	SO2-GC-FPD	53	.0037	.0078	.0049	.0026	.6681
17	SO2-COND	SO2-GC-FPD	53	.0016	.0040	.0049	.0026	.5863
18	OX-COUL	OZONE-CHEM	96	.0065	.0052	.0049	.0054	.9738
19	OX-COUL	OZONE-GAS PH	96	.0065	.0052	.0041	.0060	.9763
20	OX-COUL	OX-COLOR	77	.0073	.0054	.0134	.0056	.8444

APPENDIX D

Monthly Diurnal Averages of O_x, O_3 and SO_2 Concentrations


DIURNAL AVG FOR (MON-DAY-HR) 9 4 0600 TO 9 30 2300
SENSOR: OX-COUL
(CORRECTED)
CONCENTRATION (PPM)
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.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 24 24 24 24 24 23 23 22 21 21 19 20 21 21 23 23 24 25 25 25 25 25 25 25
SD- 0.00410 0.00421 0.00749 0.00624 0.00606 0.00700 0.00599 0.00405 0.00476 0.00885 0.0158 0.0294 0.0428 0.0445 0.0410 0.0456 0.0356 0.0232 0.0212 0.0141 0.00919 0.00687 0.00545 0.0076
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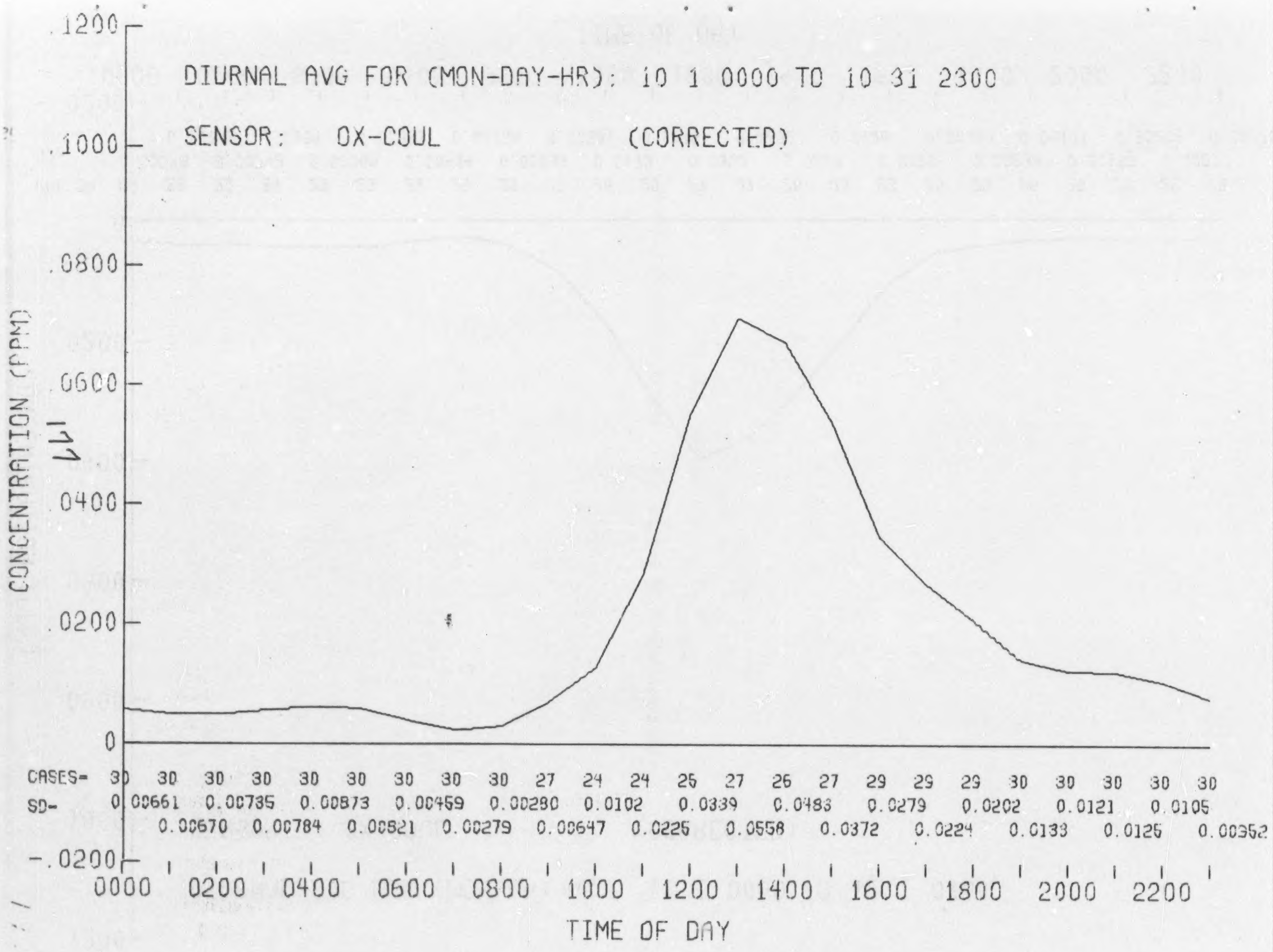
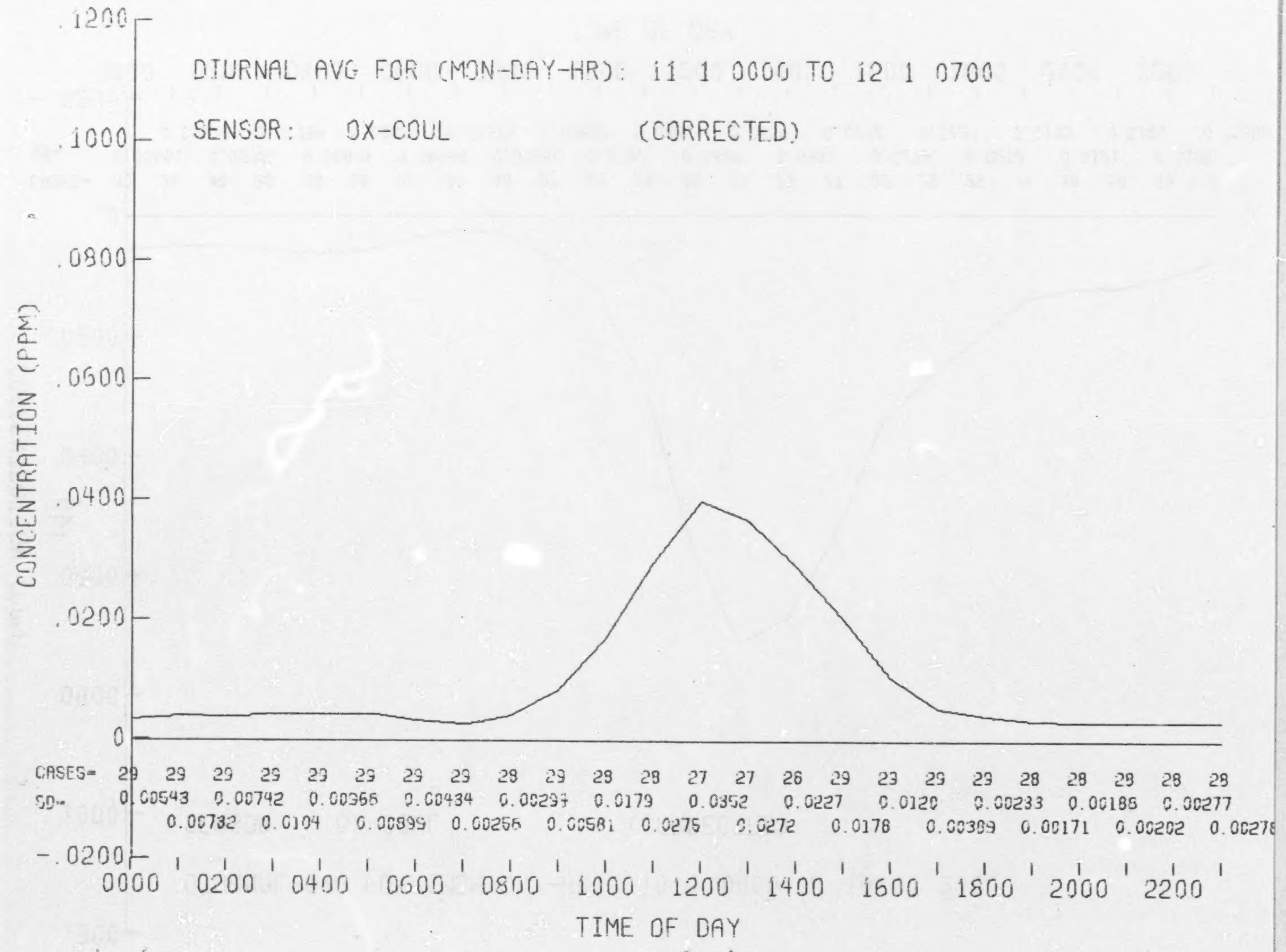
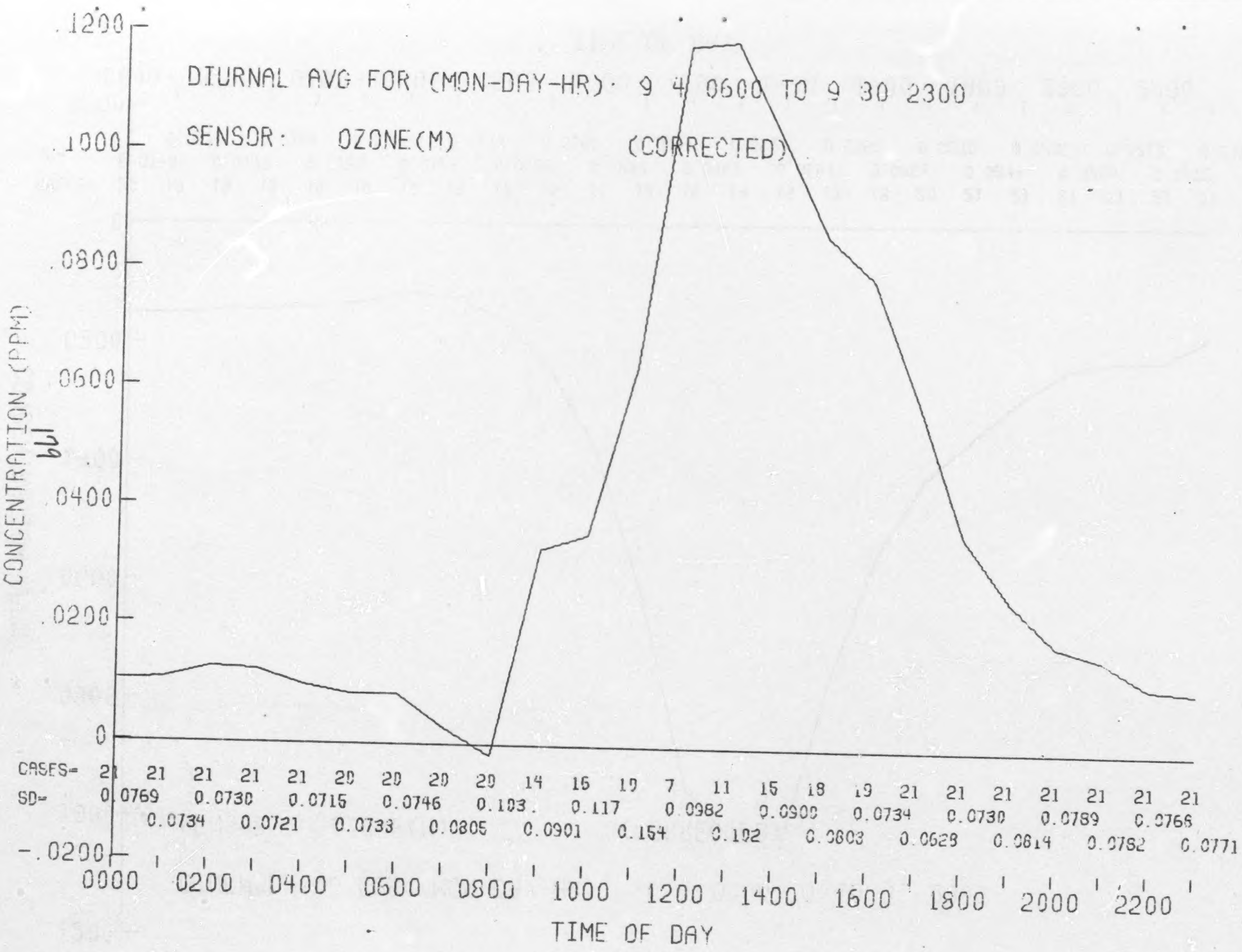
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY



DIURNAL AVG FOR (MON-DAY-HR): 10 1 0000 TO 10 31 2300

SENSOR: OX-COUL (CORRECTED)


DIURNAL AVG FOR (MON-DAY-HR): 11 1 0000 TO 12 1 0700
SENSOR: OX-COUL
(CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 29 29 29 29 29 29 29 29 28 29 28 28 27 27 26 29 23 29 29 28 28 28 28 28
SD= 0.00543 0.00732 0.00742 0.0104 0.00366 0.00899 0.00434 0.00256 0.00294 0.00581 0.0179 0.0275 0.0352 0.0272 0.0227 0.0178 0.0120 0.00309 0.00233 0.00171 0.00186 0.00202 0.00277 0.00278
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY


DIURNAL AVG FOR (MON-DAY-HR) 9 4 0600 TO 9 30 2300
SENSOR: OZONE(M)
(CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 21 21 21 21 21 20 20 20 20 14 16 19 7 11 15 18 19 21 21 21 21 21 21 21
SD= 0.0769 0.0734 0.0730 0.0721 0.0715 0.0733 0.0746 0.0805 0.103 0.0901 0.117 0.154 0.0982 0.102 0.0900 0.0803 0.0734 0.0628 0.0730 0.0614 0.0789 0.0782 0.0766 0.0771
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0200
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0600
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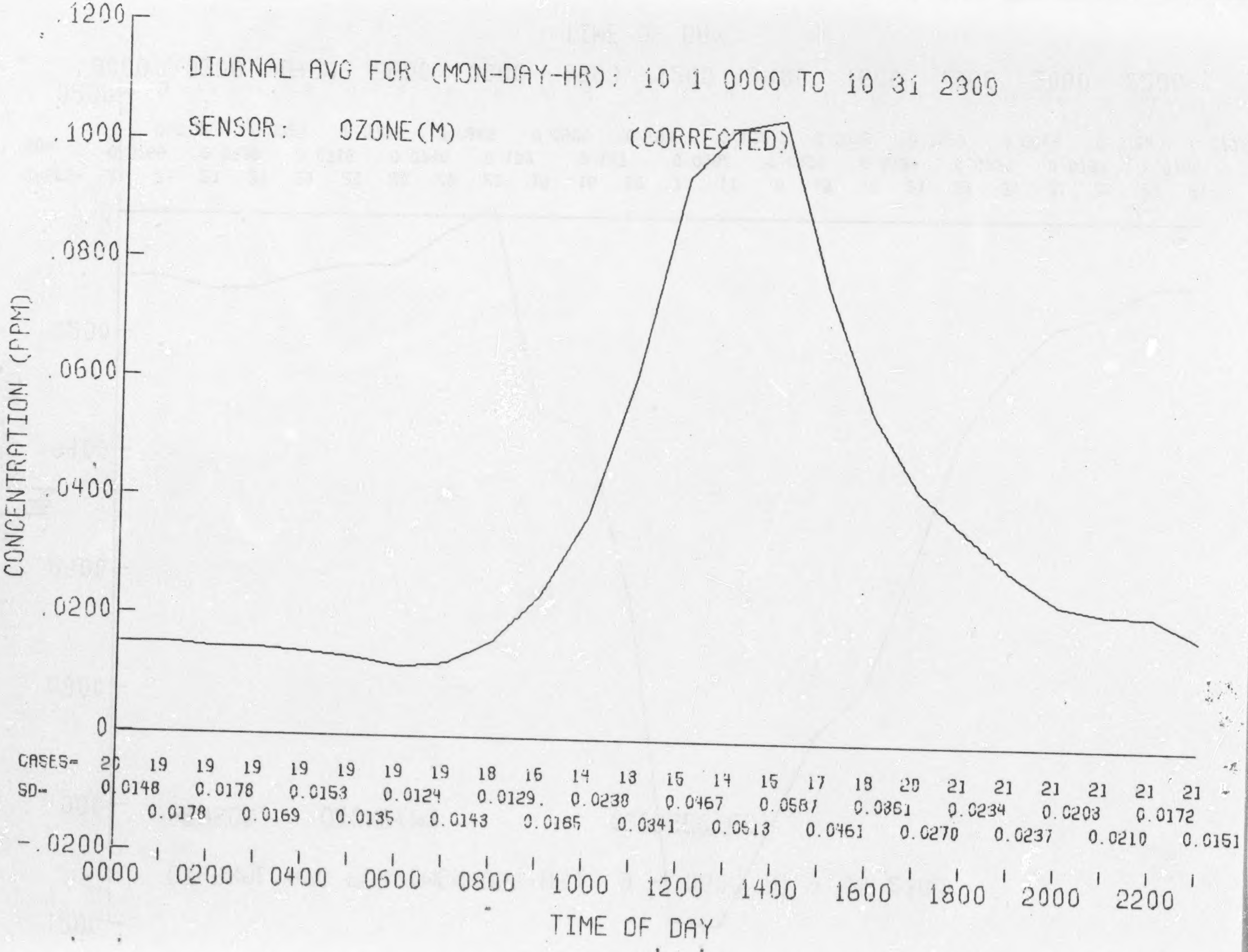
1600
1800
2000
2200
TIME OF DAY


DIURNAL AVG FOR (MON-DAY-HR): 10 1 0000 TO 10 31 2300
SENSOR: OZONE(M)
(CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 20 19 19 19 19 19 19 19 18 16 14 13 15 14 15 17 18 20 21 21 21 21 21 21
SD= 0.0148 0.0178 0.0178 0.0169 0.0153 0.0135 0.0124 0.0143 0.0129 0.0165 0.0238 0.0341 0.0467 0.0513 0.0587 0.0461 0.0361 0.0270 0.0234 0.0237 0.0203 0.0210 0.0172 0.0151
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0200
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0600
0800
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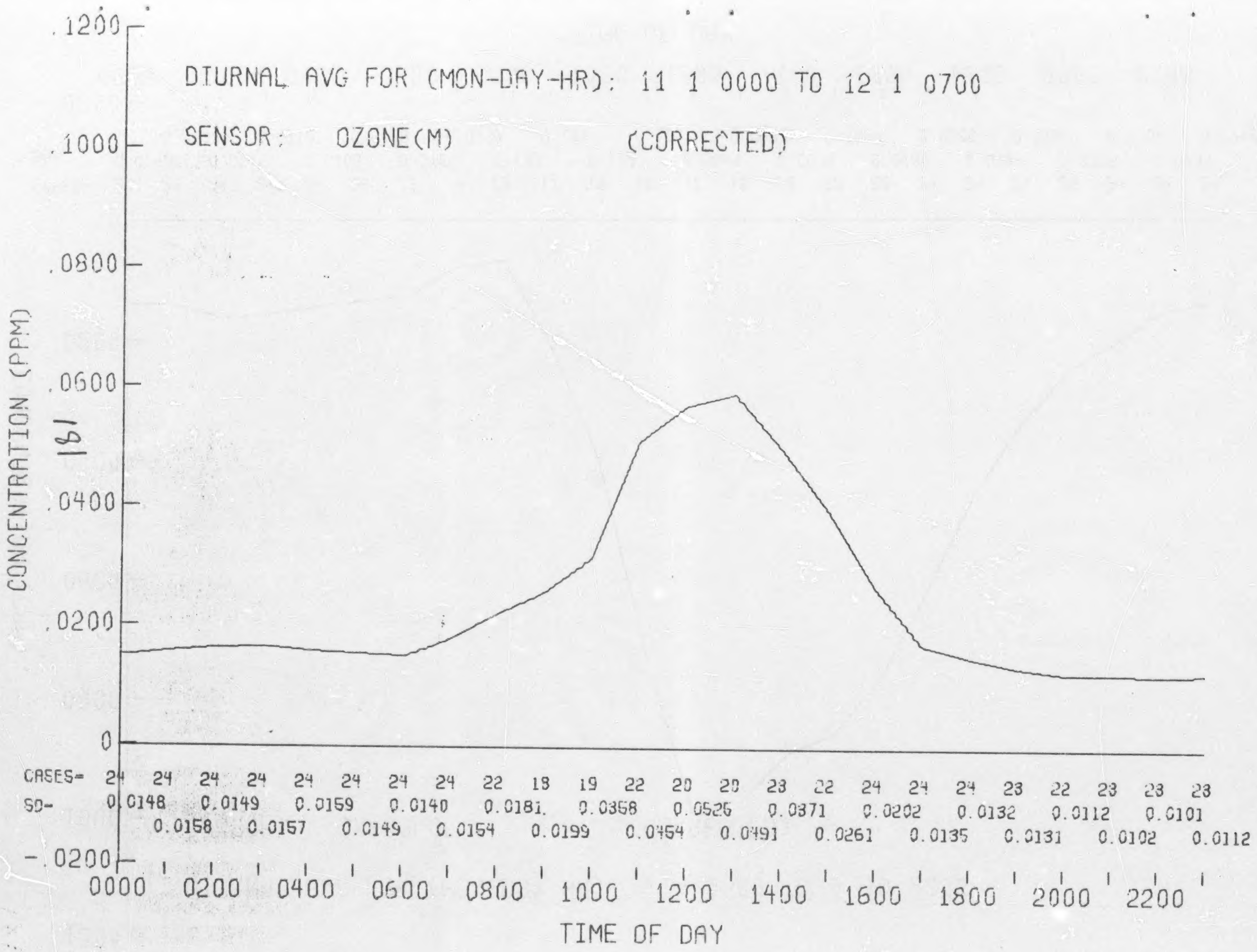
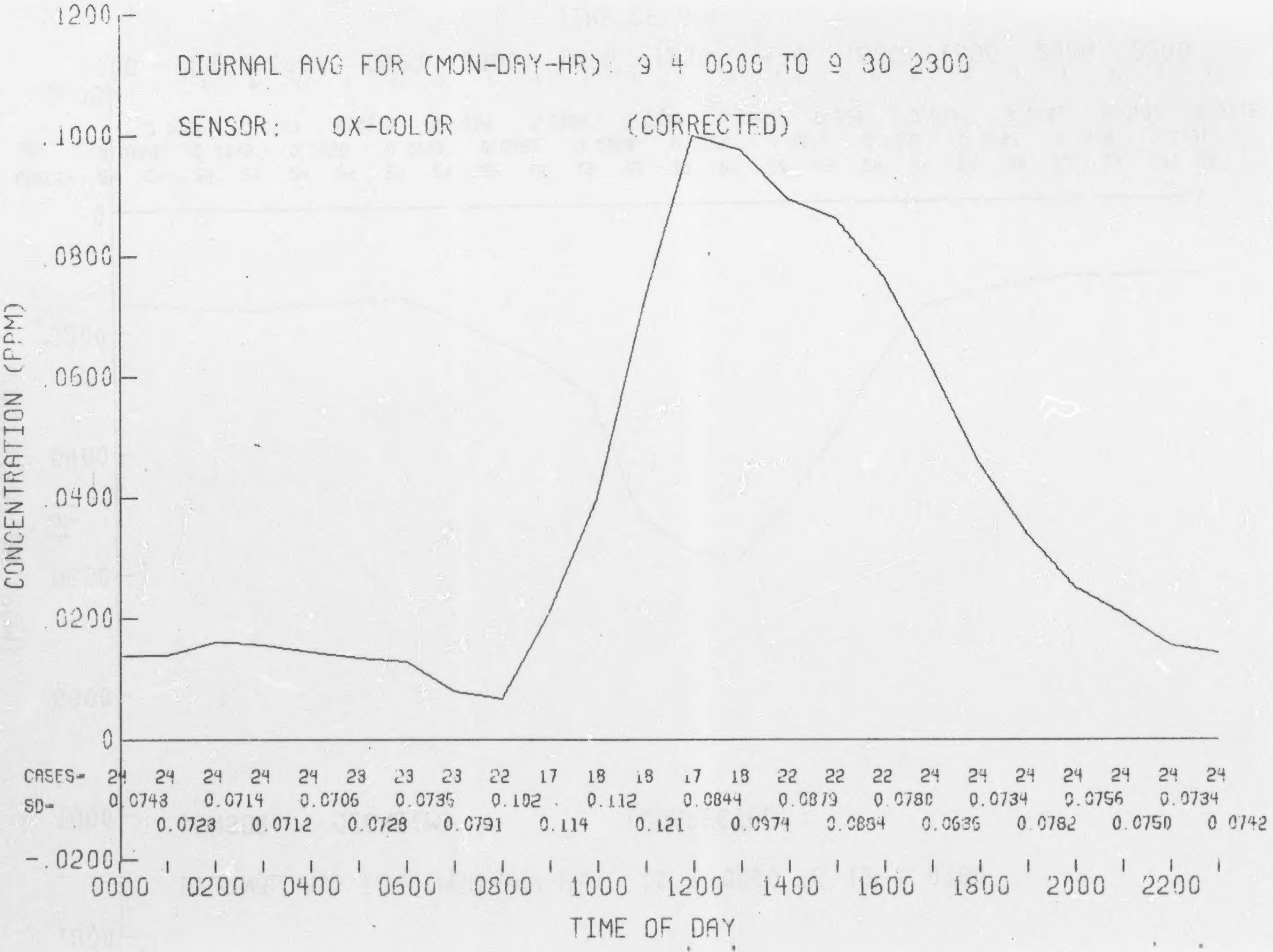
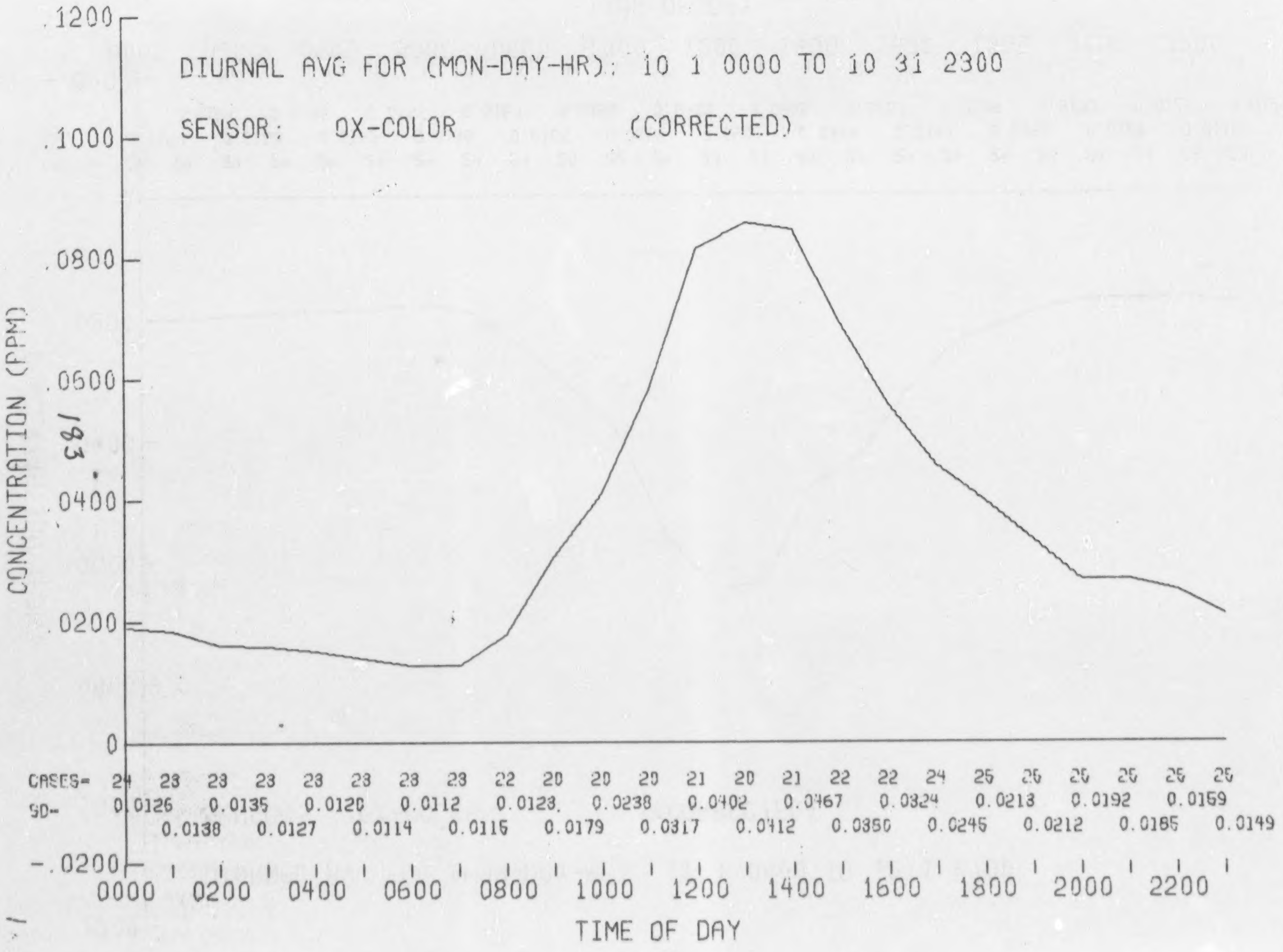
1200
1400
1600
1800
2000
2200
TIME OF DAY


DIURNAL AVG FOR (MON-DAY-HR): 11 1 0000 TO 12 1 0700
SENSOR: OZONE(M) (CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 24 24 24 24 24 24 24 24 22 18 19 22 20 20 23 22 24 24 24 23 22 23 23 23
SD- 0.0148 0.0158 0.0149 0.0157 0.0159 0.0149 0.0140 0.0154 0.0181 0.0199 0.0358 0.0454 0.0525 0.0491 0.0371 0.0261 0.0202 0.0135 0.0132 0.0131 0.0112 0.0102 0.0101 0.0112
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY


DIURNAL AVG FOR (MON-DAY-HR): 9 4 0600 TO 9 30 2300

SENSOR: OX-COLOR (CORRECTED)


DIURNAL AVG FOR (MON-DAY-HR): 10 1 0000 TO 10 31 2300
SENSOR: OX-COLOR (CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES- 24 23 23 23 23 23 23 23 22 20 20 20 21 20 21 22 22 24 25 25 25 25 25 25
SD- 0.0126 0.0138 0.0135 0.0127 0.0120 0.0114 0.0112 0.0115 0.0123 0.0179 0.0238 0.0317 0.0402 0.0412 0.0467 0.0350 0.0324 0.0245 0.0213 0.0212 0.0192 0.0185 0.0159 0.0149
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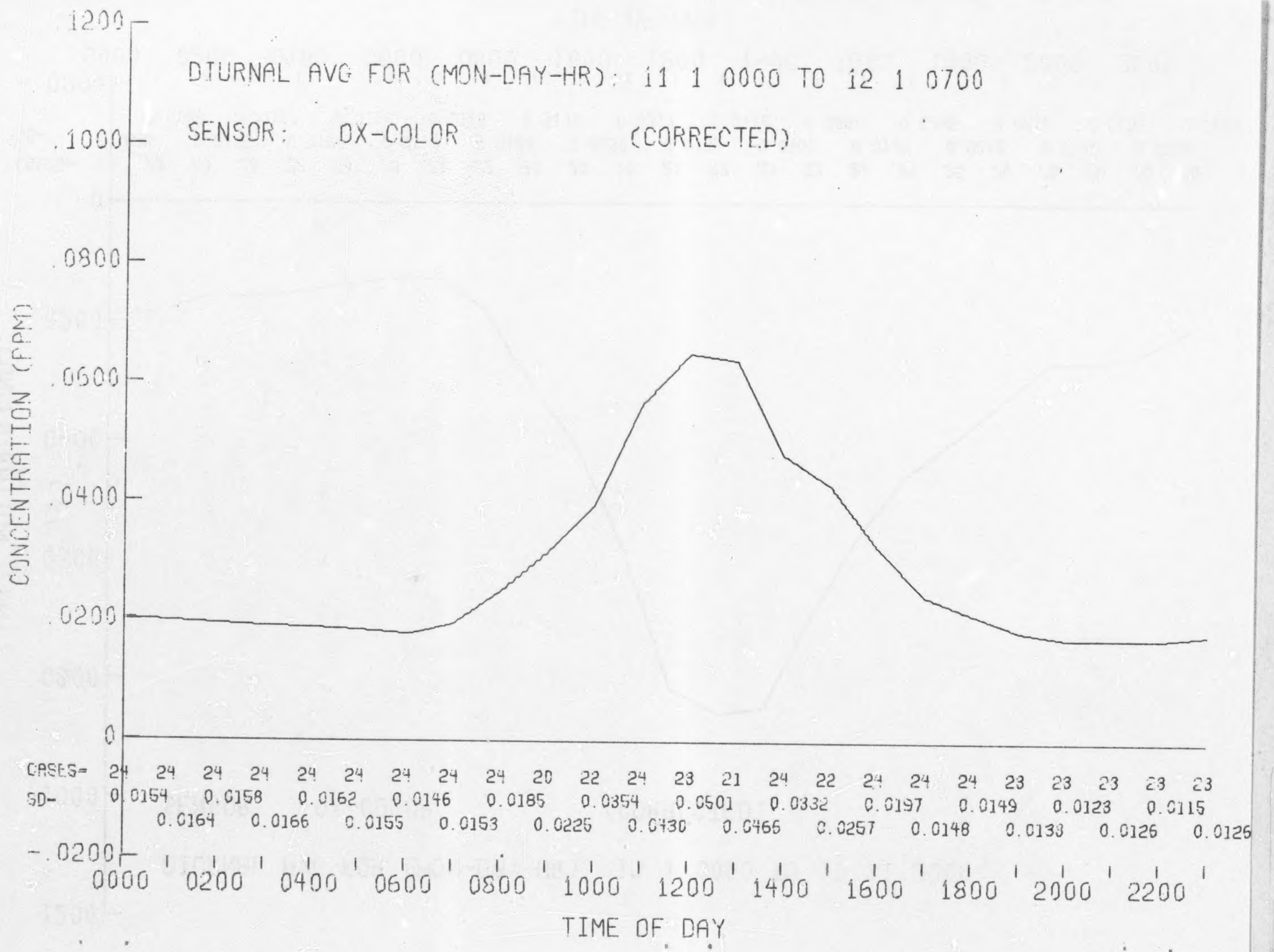
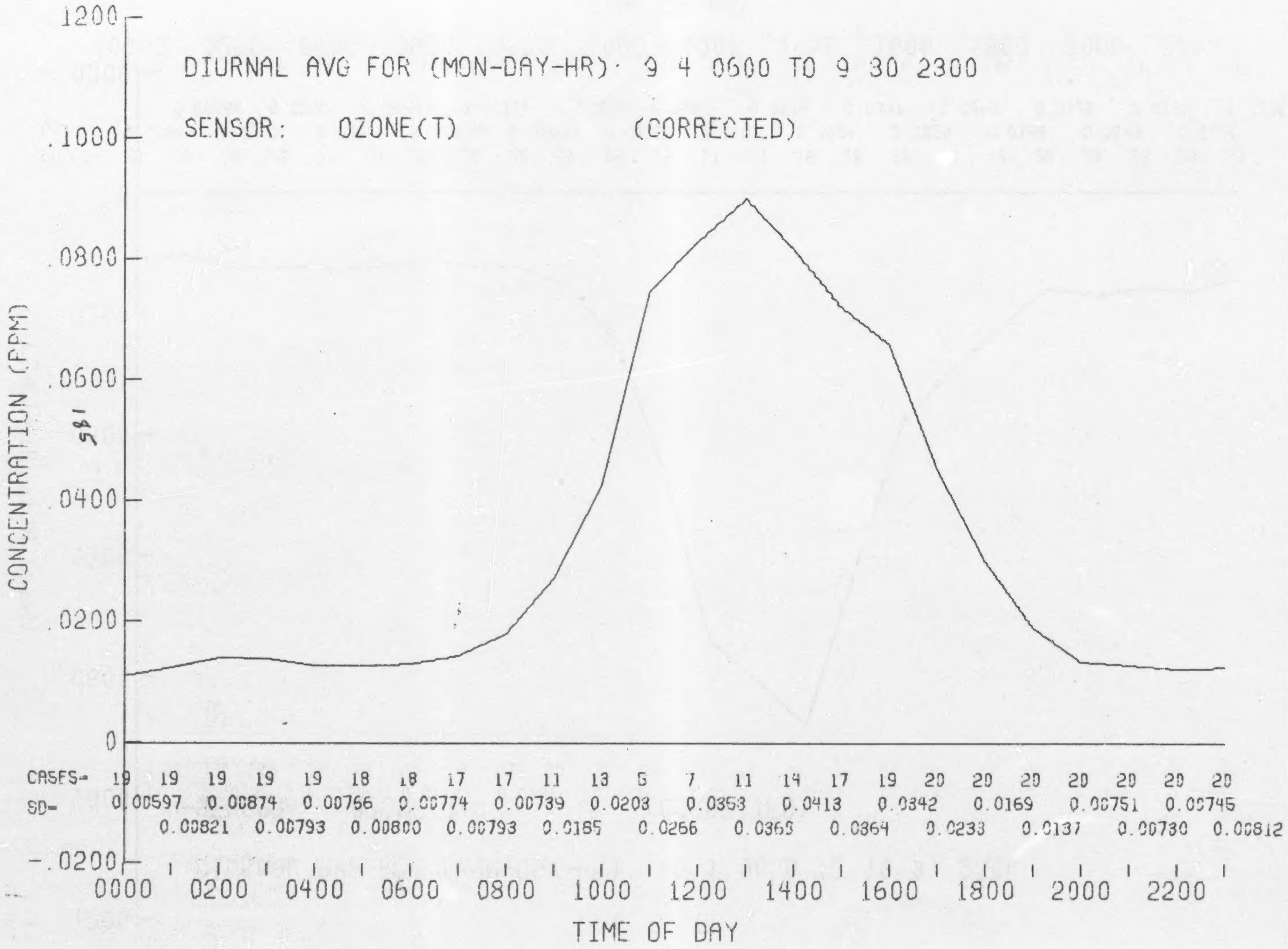
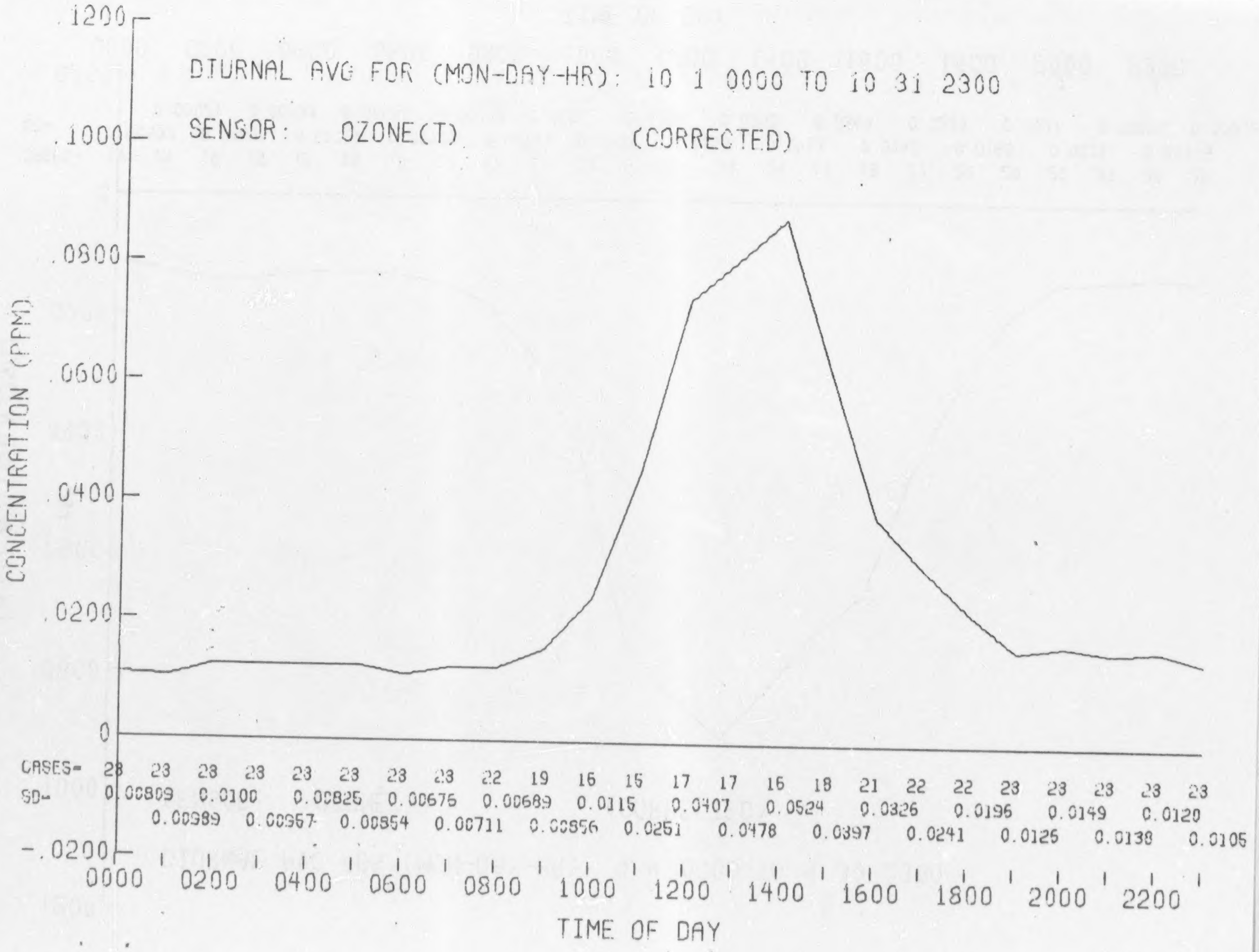
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY

183


DIURNAL AVG FOR (MON-DAY-HR): 11 1 0000 TO 12 1 0700
SENSOR: OX-COLOR (CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 24 24 24 24 24 24 24 24 24 20 22 24 23 21 24 22 24 24 24 23 23 23 23 23
SD- 0.0154 0.0164 0.0158 0.0166 0.0162 0.0155 0.0146 0.0153 0.0185 0.0225 0.0354 0.0430 0.0501 0.0466 0.0332 0.0257 0.0197 0.0148 0.0149 0.0133 0.0123 0.0126 0.0115 0.0126
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY


DIURNAL AVG FOR (MON-DAY-HR) 9 4 0600 TO 9 30 2300
SENSOR: OZONE(T) (CORRECTED)
CONCENTRATION (PPM)
1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES- 19 19 19 19 19 18 18 17 17 11 13 5 7 11 14 17 19 20 20 20 20 20 20 20
SD- 0.00597 0.00821 0.00874 0.00793 0.00766 0.00800 0.00774 0.00793 0.00739 0.0185 0.0203 0.0266 0.0353 0.0369 0.0413 0.0364 0.0342 0.0233 0.0169 0.0137 0.00751 0.00730 0.00745 0.00812
0000 0200 0400 0600 0800 1000 1200 1400 1600 1800 2000 2200
TIME OF DAY


DIURNAL AVG FOR (MON-DAY-HR): 10 1 0000 TO 10 31 2300
SENSOR: OZONE(T) (CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 23 23 23 23 23 23 23 23 22 19 16 15 17 17 16 18 21 22 22 23 23 23 23 23
SD= 0.00809 0.0100 0.00825 0.00675 0.00689 0.0115 0.0407 0.0524 0.0326 0.0196 0.0149 0.0120
0.00989 0.00957 0.00854 0.00711 0.00856 0.0251 0.0478 0.0397 0.0241 0.0125 0.0138 0.0105
0000
0200
0400
0600
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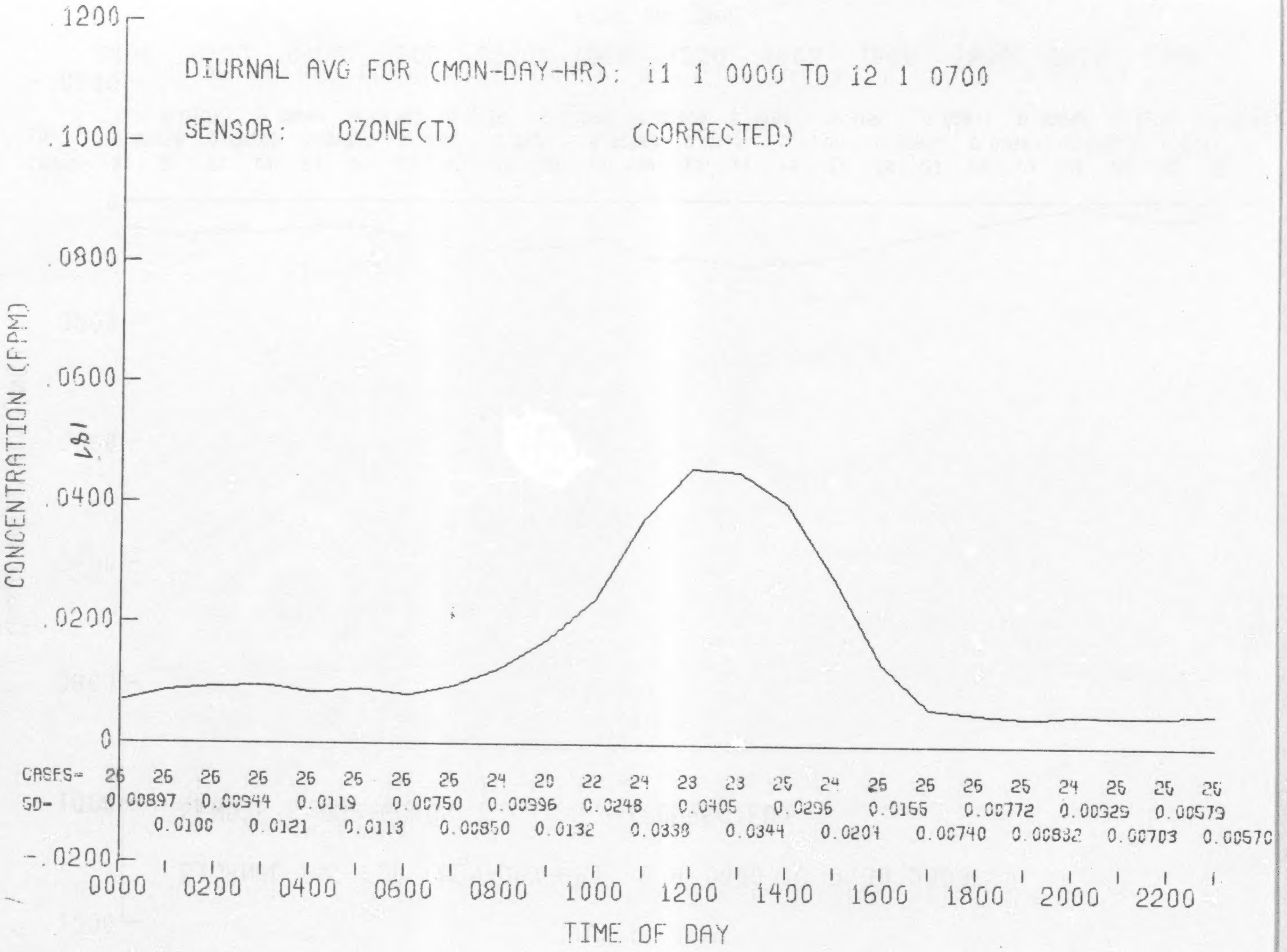
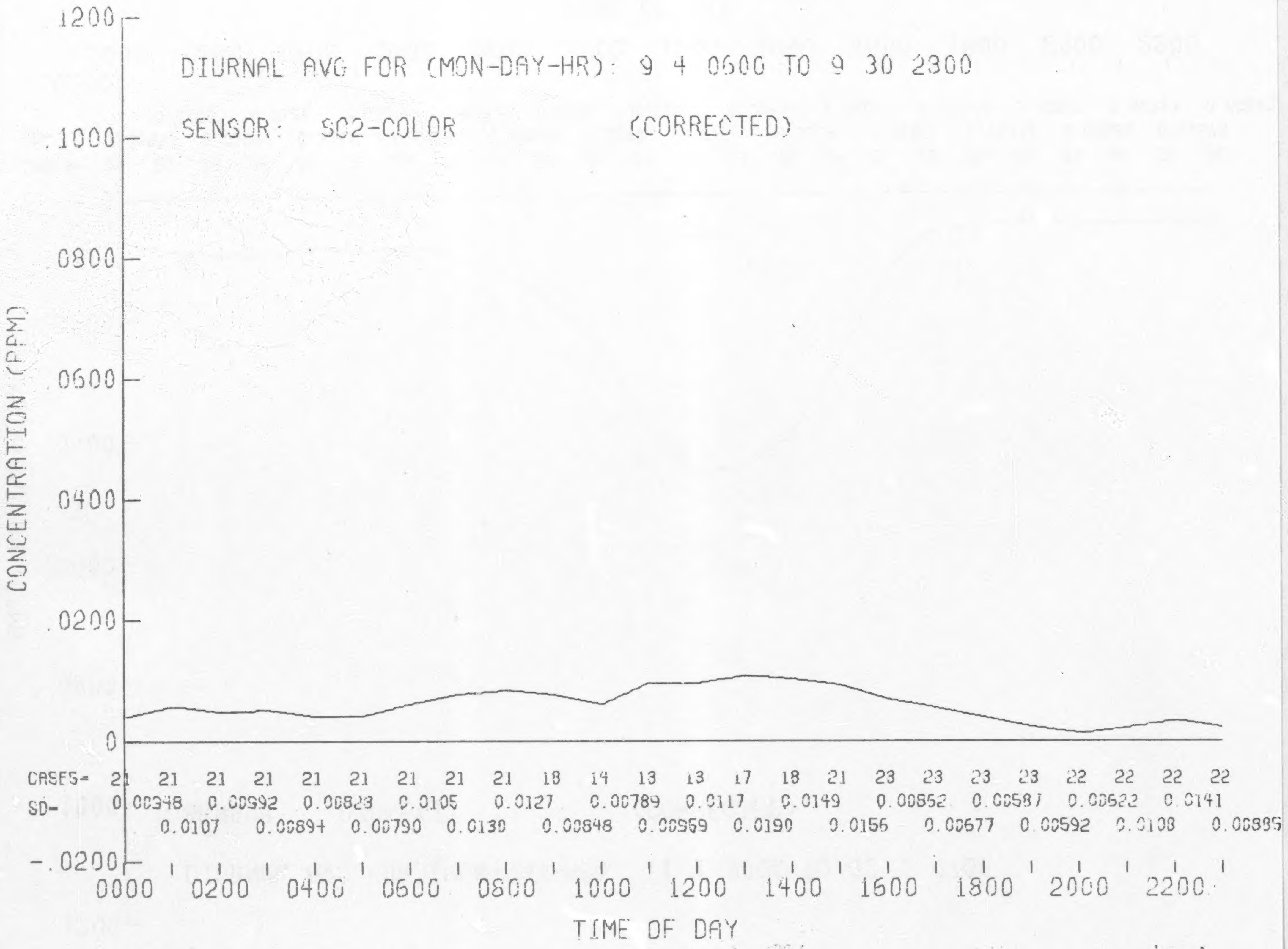
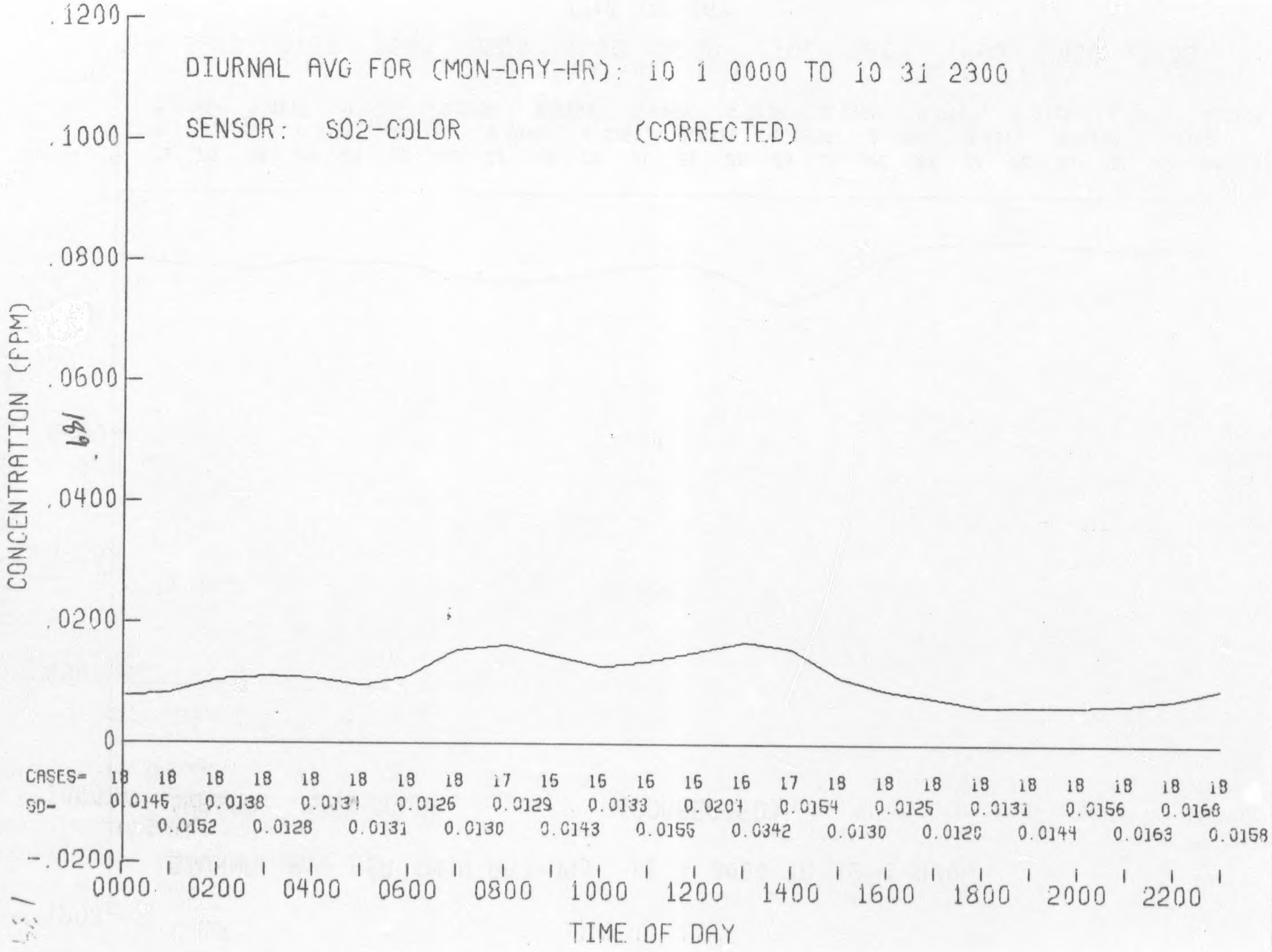
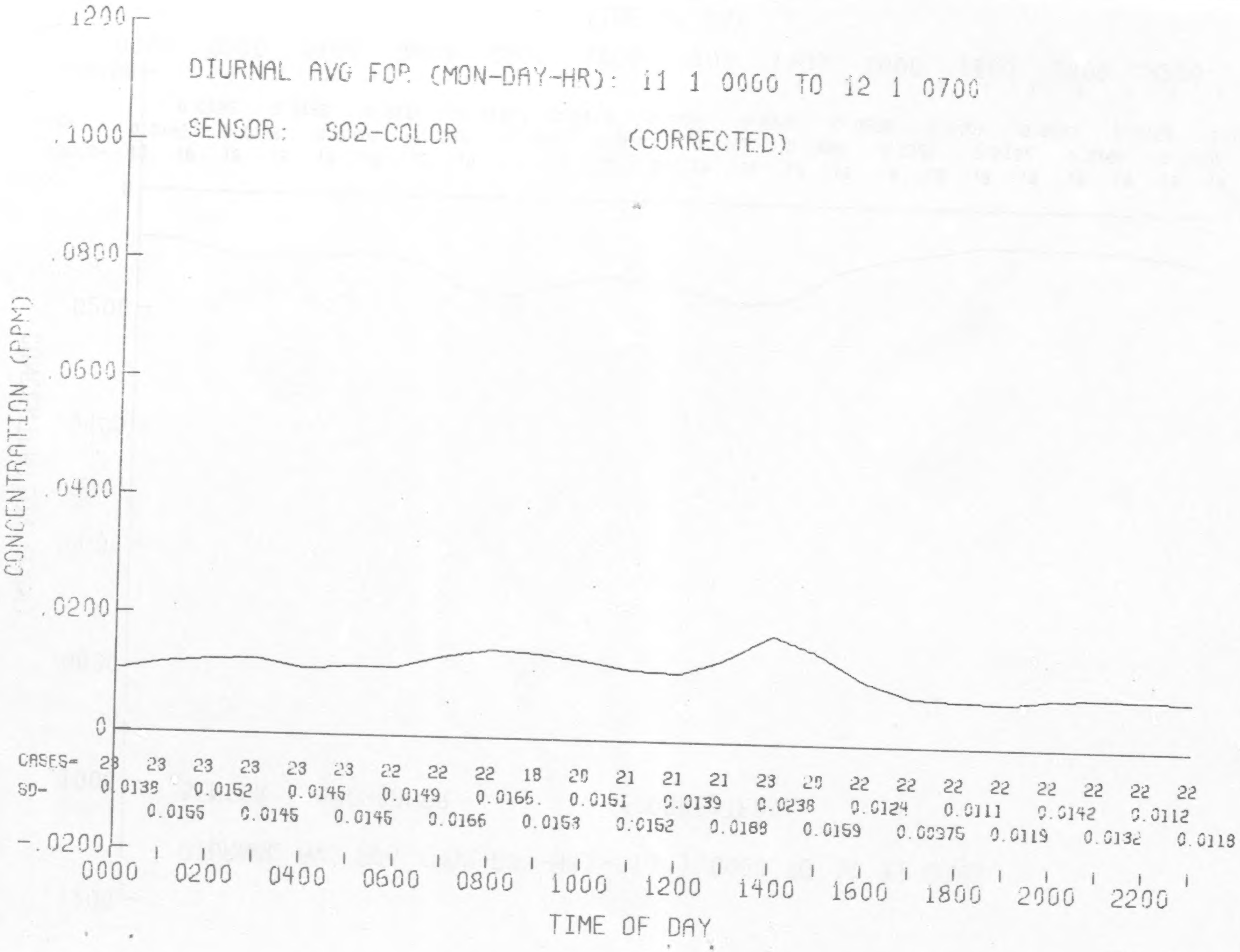
1600
1800
2000
2200
TIME OF DAY


DIURNAL AVG FOR (MON-DAY-HR): 11 1 0000 TO 12 1 0700
SENSOR: OZONE(T) (CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 26 26 26 26 26 26 26 26 24 20 22 24 23 23 25 24 25 26 25 25 24 25 25 25
SD- 0.00897 0.0100 0.00944 0.0121 0.0119 0.0113 0.00750 0.00850 0.00996 0.0132 0.0248 0.0339 0.0405 0.0344 0.0296 0.0204 0.0155 0.00740 0.00772 0.00832 0.00925 0.00703 0.00579 0.00570
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY

187


DIURNAL AVG FOR (MON-DAY-HR): 9 4 0600 TO 9 30 2300
SENSOR: SO2-COLOR
(CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 21 21 21 21 21 21 21 21 21 18 14 13 13 17 18 21 23 23 23 23 22 22 22 22
SD- 0.00348 0.0107 0.00992 0.00894 0.00823 0.00790 0.0105 0.0130 0.0127 0.00848 0.00789 0.00959 0.0117 0.0190 0.0149 0.0156 0.00852 0.00677 0.00587 0.00592 0.00622 0.0108 0.0141 0.00885
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY


DIURNAL AVG FOR (MON-DAY-HR): 10 1 0000 TO 10 31 2300
SENSOR: SO2-COLOR (CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 18 18 18 18 18 18 18 18 17 15 16 16 16 16 17 18 18 18 18 18 18 18 18 18
SD- 0.0145 0.0152 0.0138 0.0128 0.0134 0.0131 0.0126 0.0130 0.0129 0.0143 0.0133 0.0155 0.0204 0.0342 0.0154 0.0130 0.0125 0.0120 0.0131 0.0144 0.0156 0.0163 0.0168 0.0158
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY


DIURNAL AVG FOR (MON-DAY-HR): 11 1 0000 TO 12 1 0700
SENSOR: SO2-COLOR
(CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 23 23 23 23 23 23 22 22 22 18 20 21 21 21 23 20 22 22 22 22 22 22 22 22
SD- 0.0138 0.0155 0.0152 0.0145 0.0145 0.0145 0.0149 0.0166 0.0166 0.0153 0.0151 0.0152 0.0139 0.0188 0.0238 0.0159 0.0124 0.00375 0.0111 0.0119 0.0142 0.0132 0.0112 0.0118
0000
0200
0400
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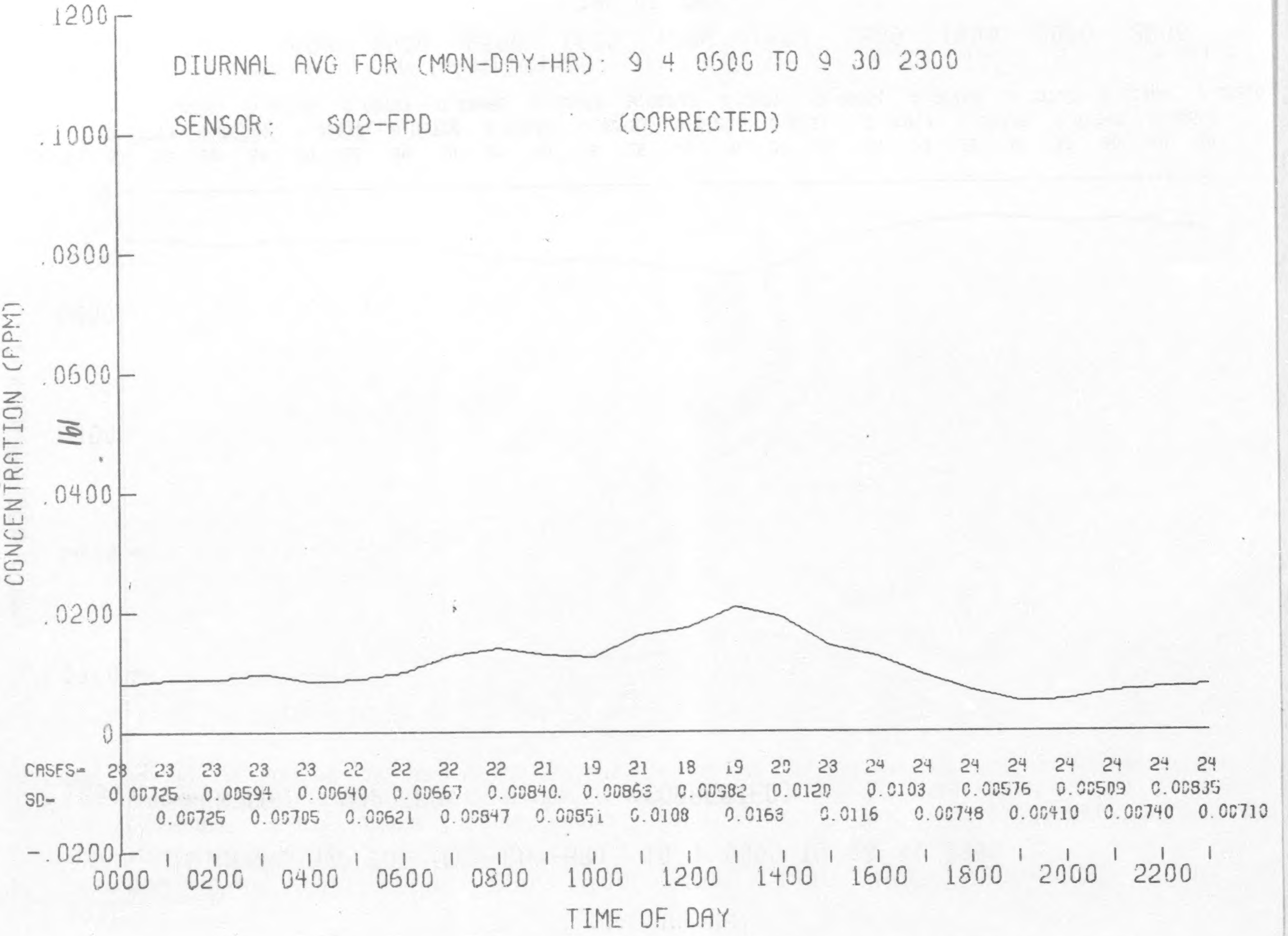
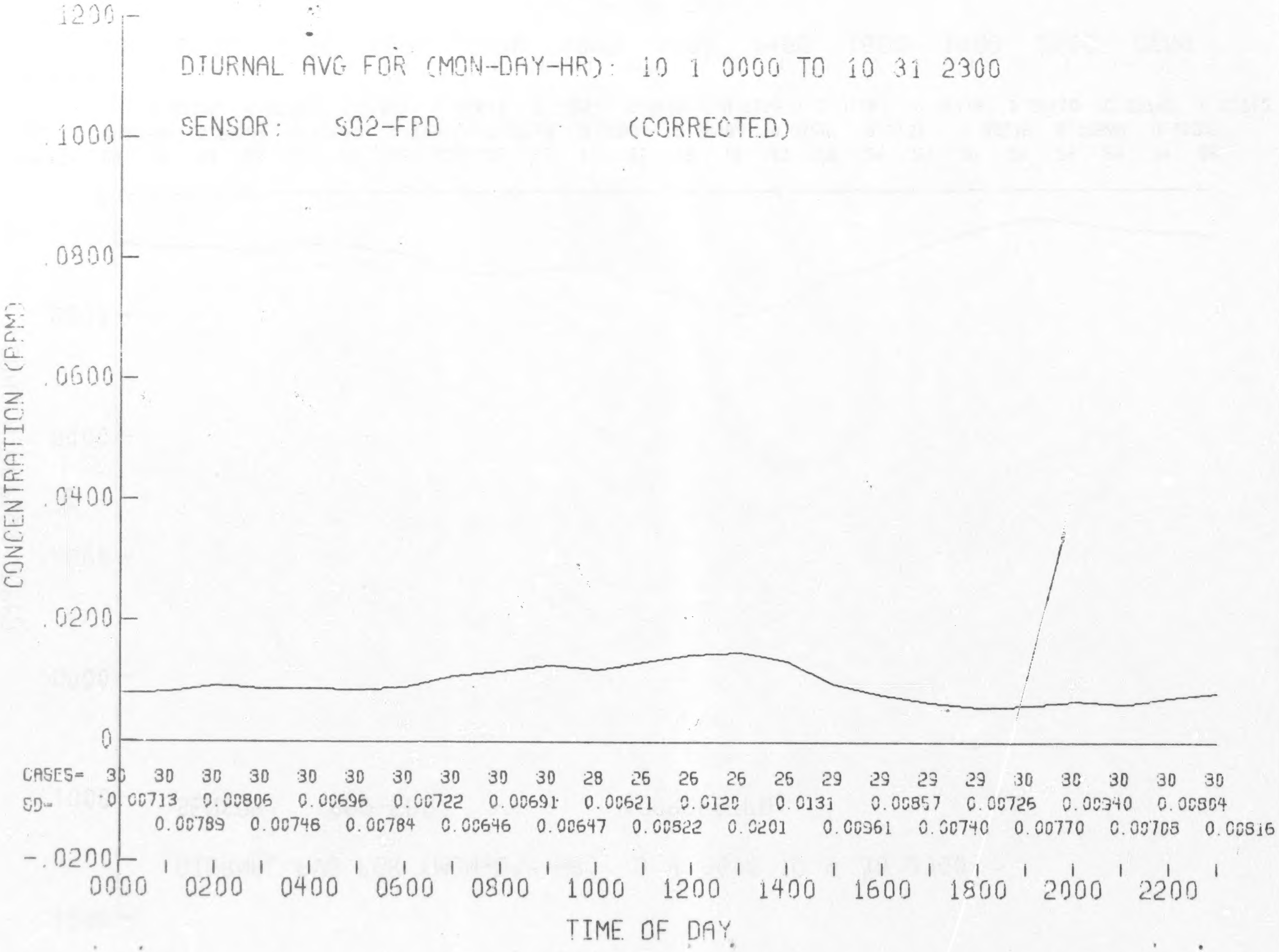
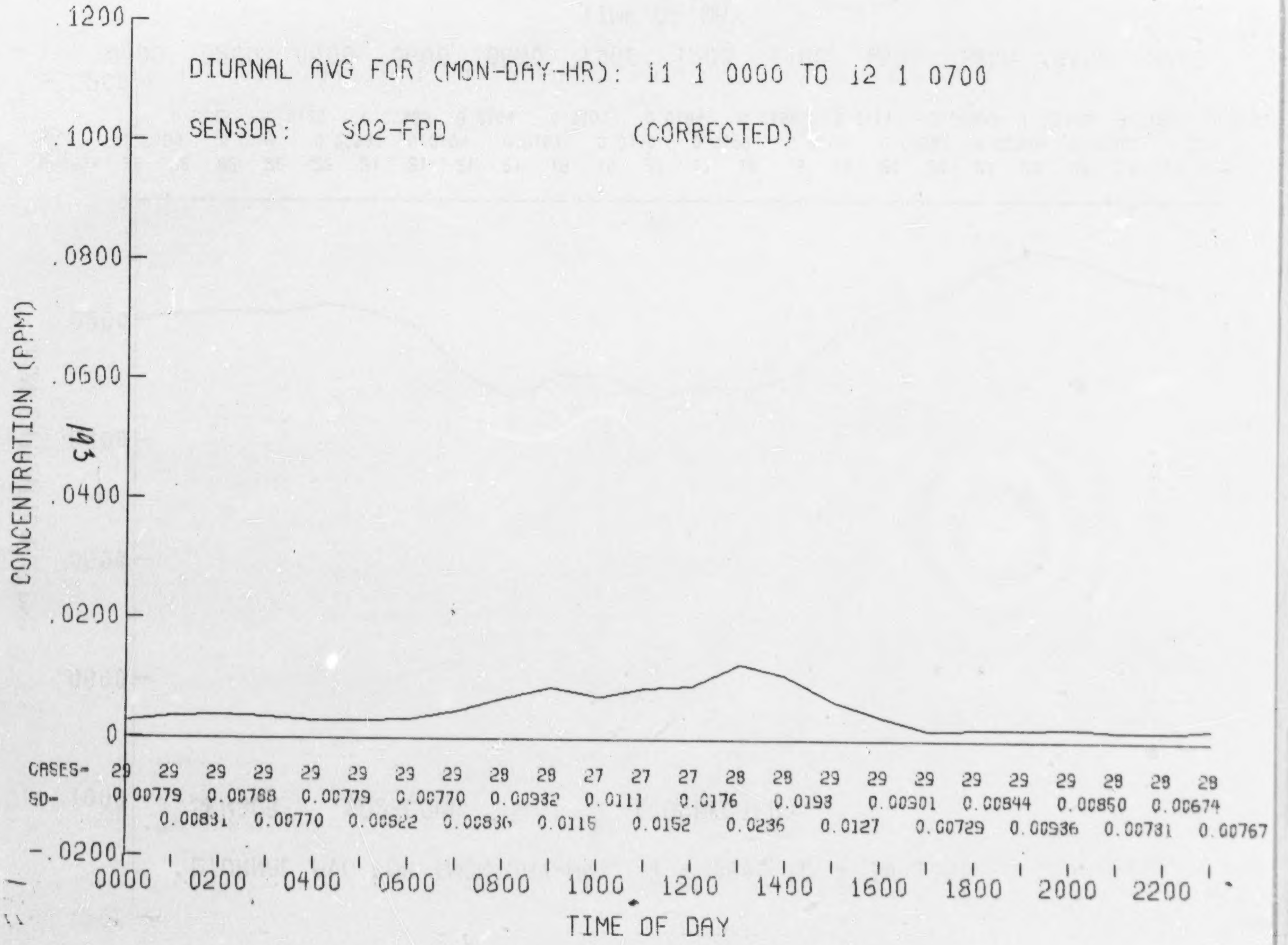
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY

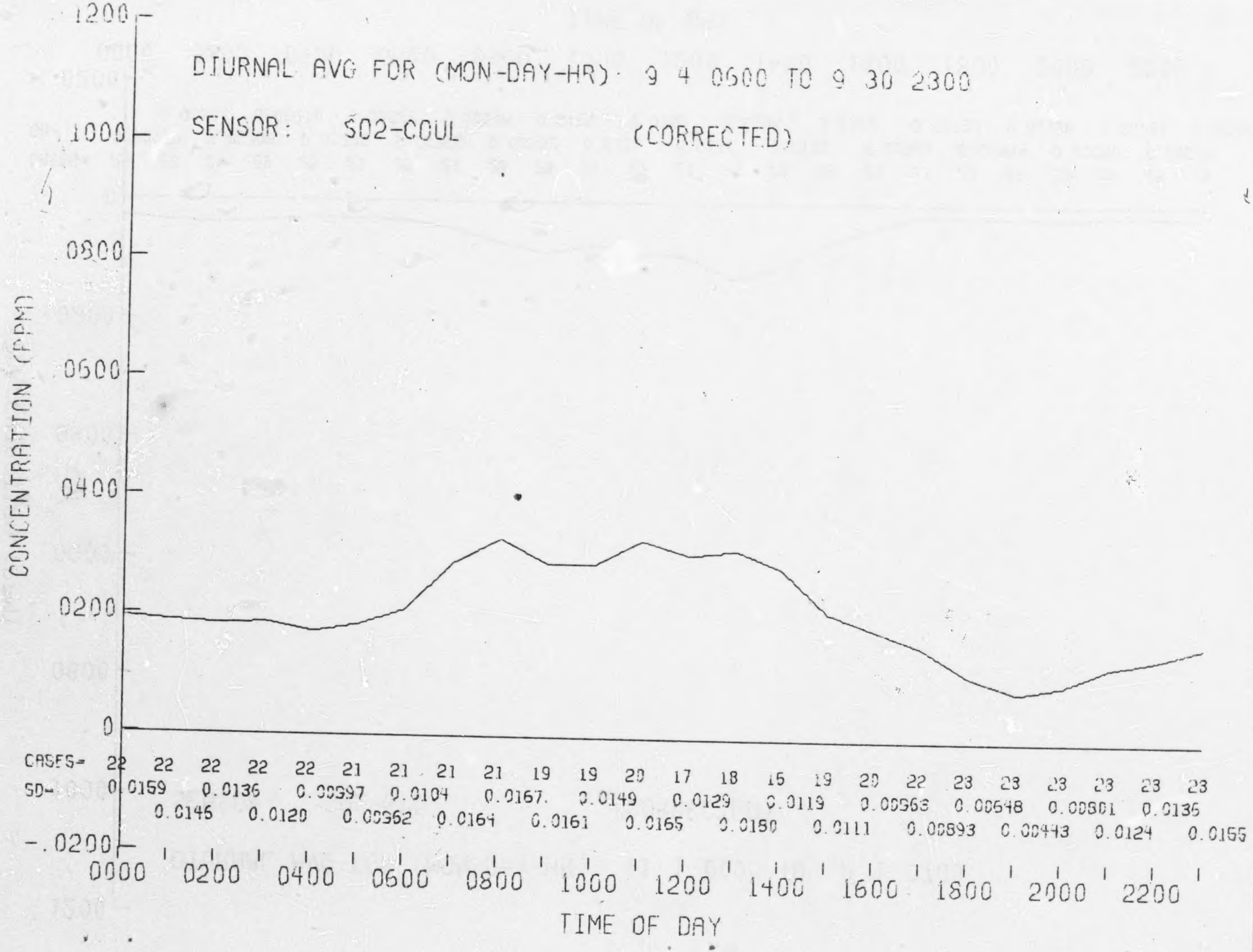
DIURNAL AVG FOR (MON-DAY-HR): 9 4 0600 TO 9 30 2300
SENSOR: S02-FPD (CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES- 28 23 23 23 23 22 22 22 22 21 19 21 18 19 20 23 24 24 24 24 24 24 24 24
SD- 0.00725 0.00725 0.00594 0.00705 0.00640 0.00621 0.00667 0.00847 0.00840. 0.00851 0.00863 0.0108 0.00982 0.0163 0.0120 0.0116 0.0103 0.00748 0.00576 0.00410 0.00509 0.00740 0.00835 0.00710
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY

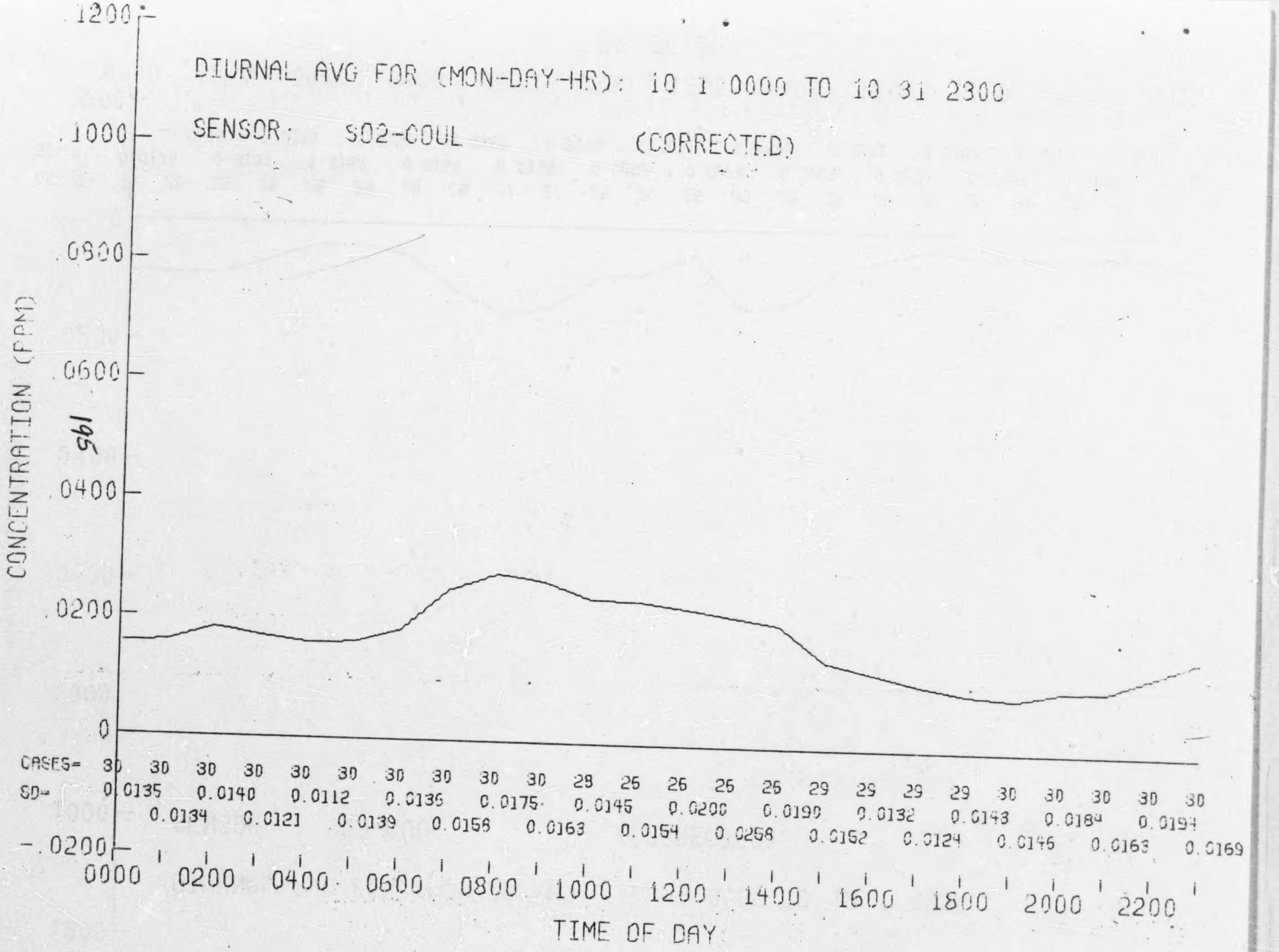


DIURNAL AVG FOR (MON-DAY-HR): 10 1 0000 TO 10 31 2300

SENSOR: SO2-FPD (CORRECTED)

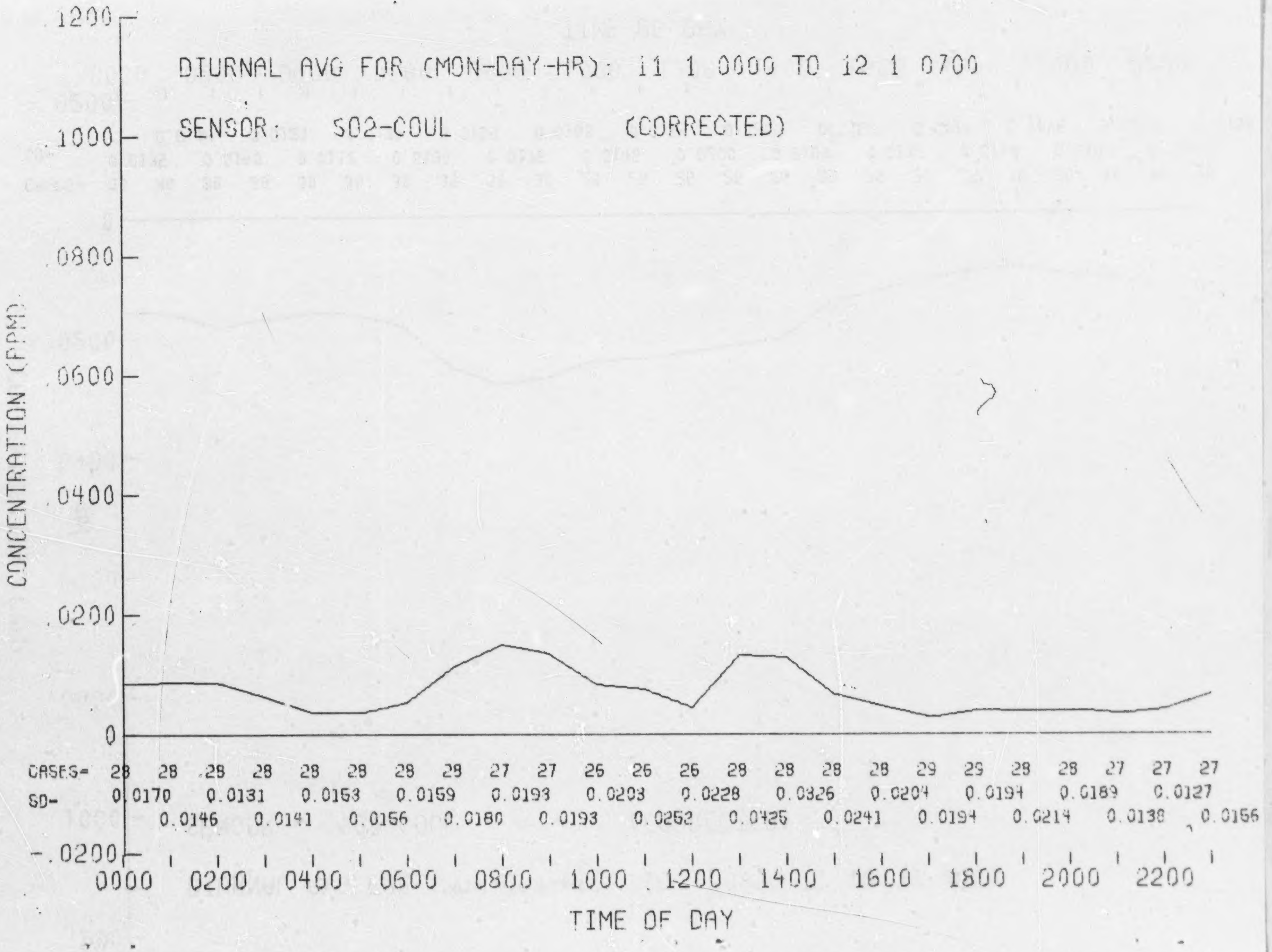

DIURNAL AVG FOR (MON-DAY-HR): 11 1 0000 TO 12 1 0700
SENSOR: SO2-FPD (CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES- 29 29 29 29 29 29 29 29 28 28 27 27 27 28 28 29 29 29 29 29 29 28 28 28
SD- 0.00779 0.00788 0.00779 0.00770 0.00932 0.0111 0.0176 0.0193 0.00301 0.00844 0.00850 0.00674
0.00831 0.00770 0.00822 0.00836 0.0115 0.0152 0.0236 0.0127 0.00729 0.00936 0.00731 0.00767
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY

DIURNAL AVG FOR (MON-DAY-HR) 9 4 0600 TO 9 30 2300
SENSOR: SO2-COUL (CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 22 22 22 22 22 21 21 21 21 19 19 20 17 18 15 19 20 22 23 23 23 23 23 23
SD= 0.0159 0.0146 0.0136 0.0120 0.00997 0.00962 0.0104 0.0164 0.0167 0.0161 0.0149 0.0165 0.0129 0.0150 0.0119 0.0111 0.00963 0.00893 0.00648 0.00443 0.00801 0.0124 0.0136 0.0155
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY



DIURNAL AVG FOR (MON-DAY-HR): 10 1 0000 TO 10 31 2300

SENSOR: SO2-COUL (CORRECTED)


DIURNAL AVG FOR (MON-DAY-HR): 11 1 0000 TO 12 1 0700
SENSOR: SO2-COUL (CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 28 28 28 28 28 28 28 28 27 27 26 26 26 28 28 28 28 29 29 28 28 27 27 27
SD- 0.0170 0.0146 0.0131 0.0141 0.0153 0.0156 0.0159 0.0180 0.0193 0.0193 0.0203 0.0252 0.0228 0.0425 0.0326 0.0241 0.0204 0.0194 0.0194 0.0214 0.0189 0.0138 0.0127 0.0156
0000
0200
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0800
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1200
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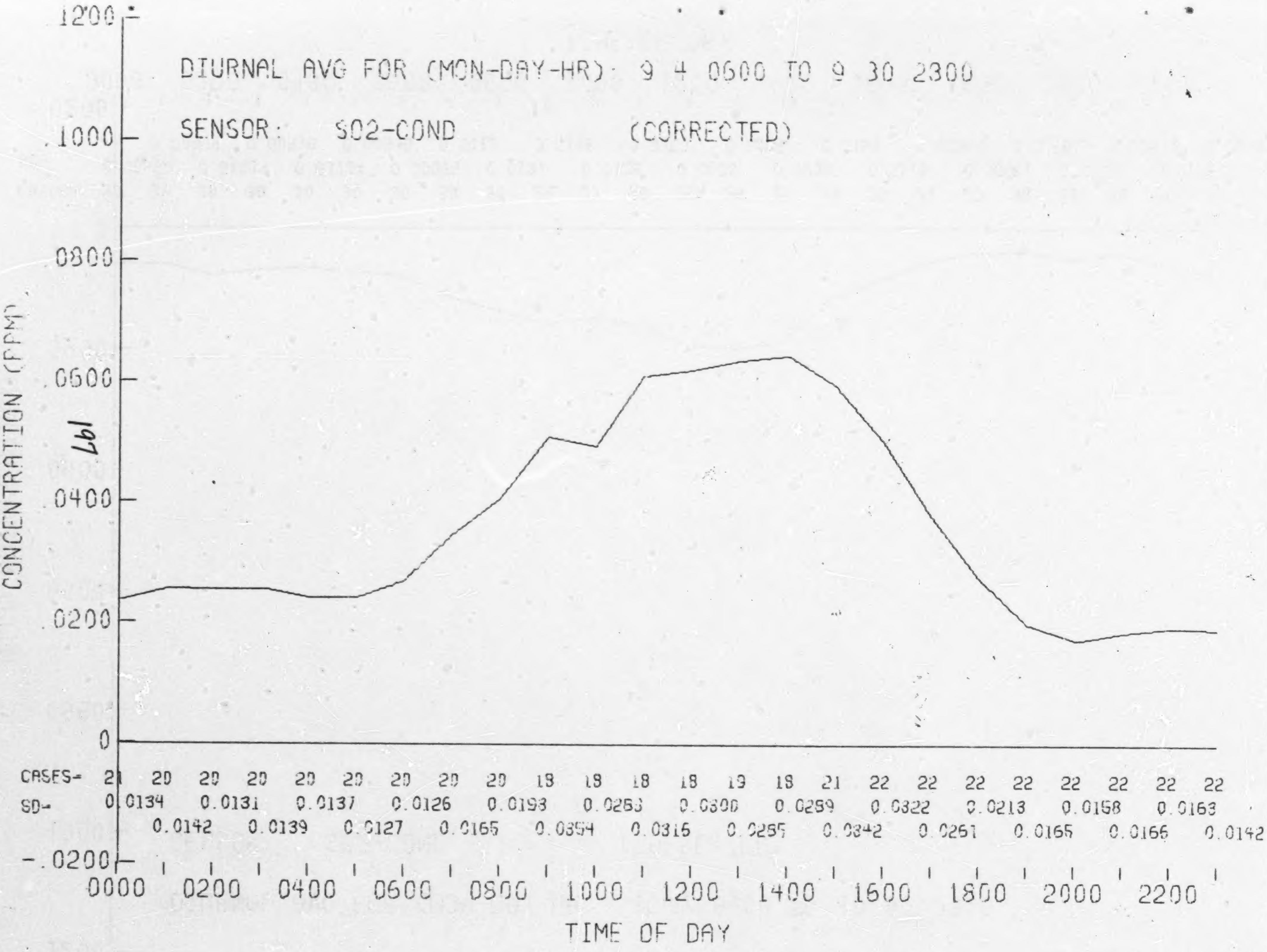
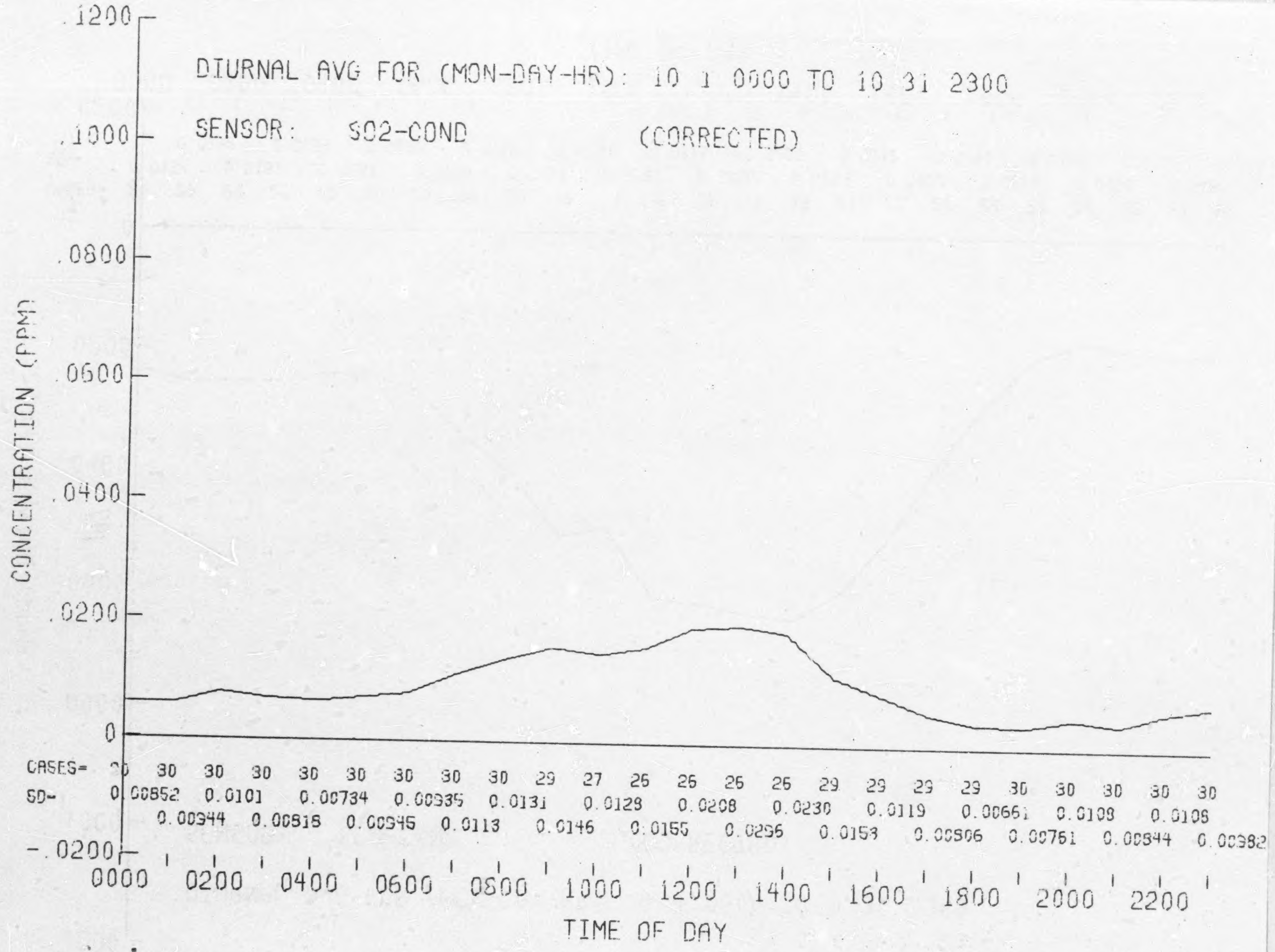
1800
2000
2200
TIME OF DAY

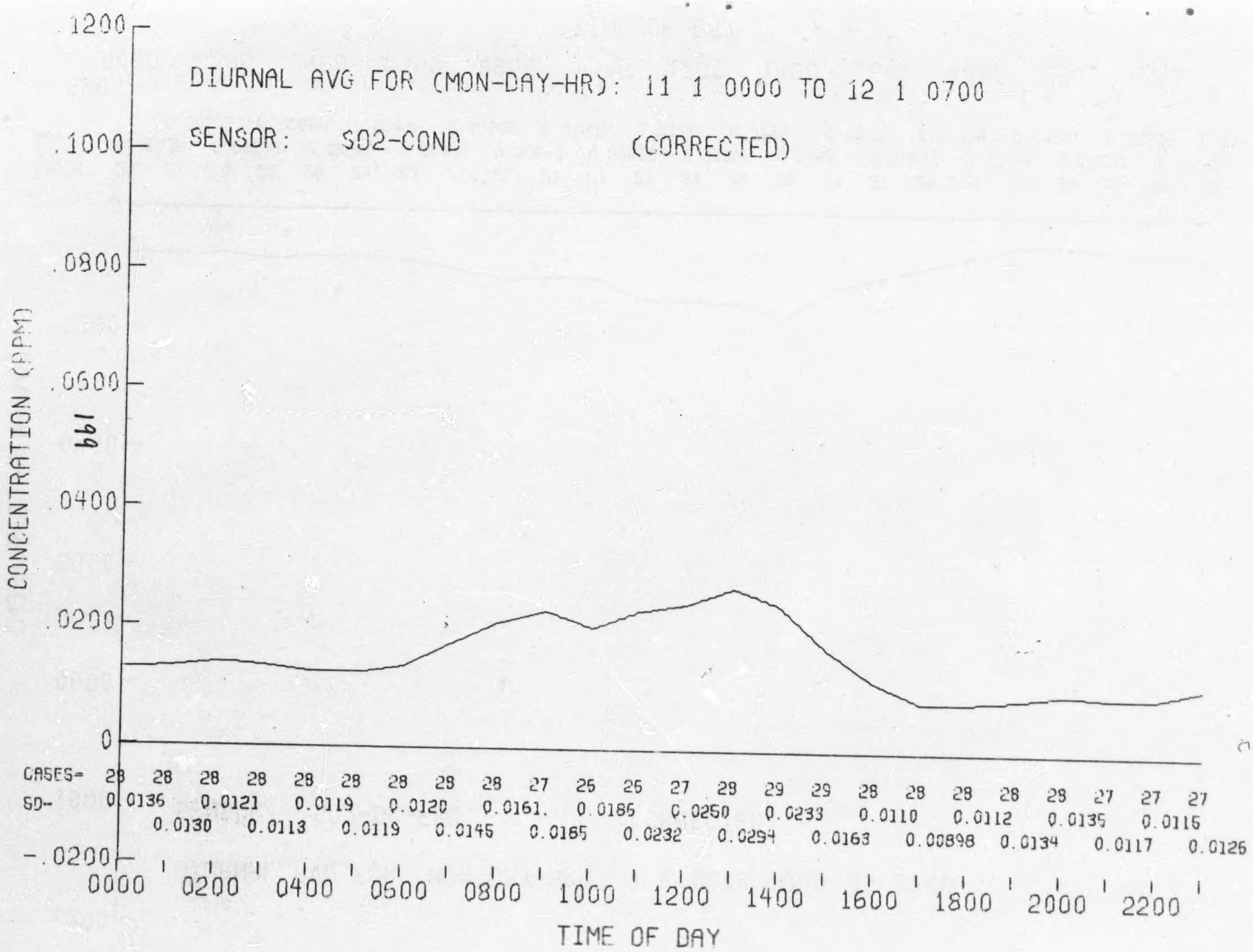

DIURNAL AVG FOR (MON-DAY-HR): 9 4 0600 TO 9 30 2300

SENSOR: SO2-COND (CORRECTED)

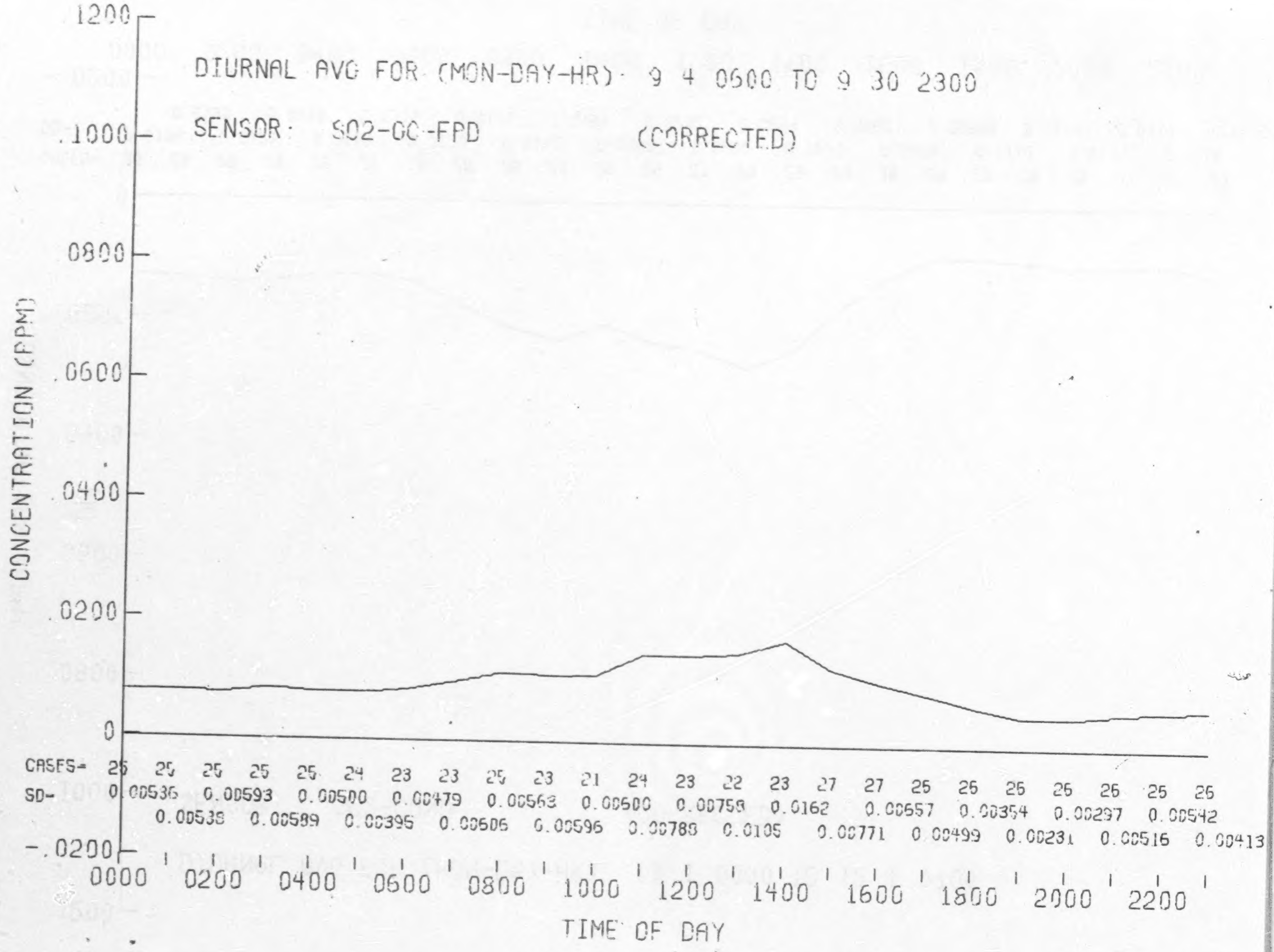


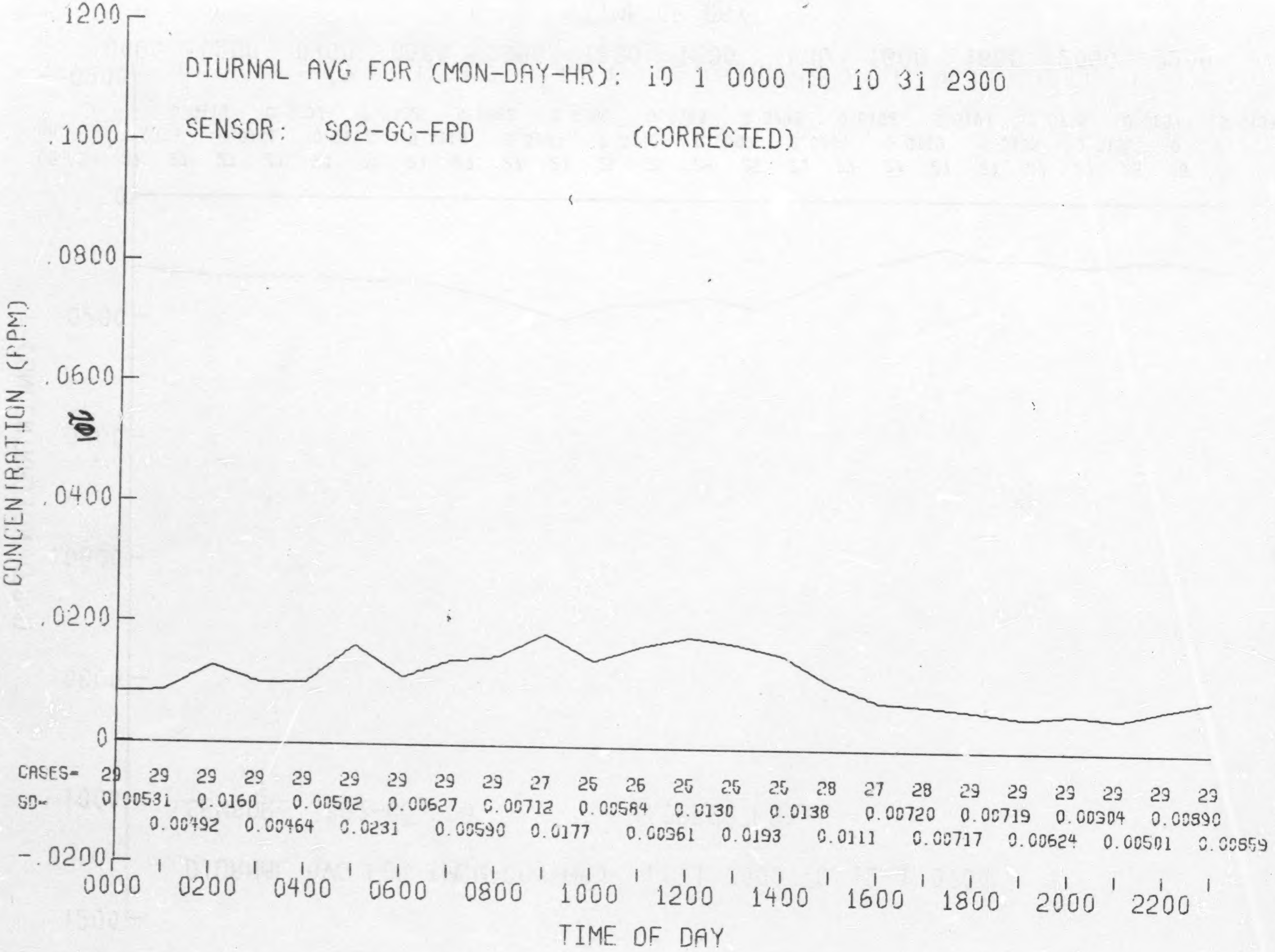
DIURNAL AVG FOR (MON-DAY-HR): 10 1 0000 TO 10 31 2300

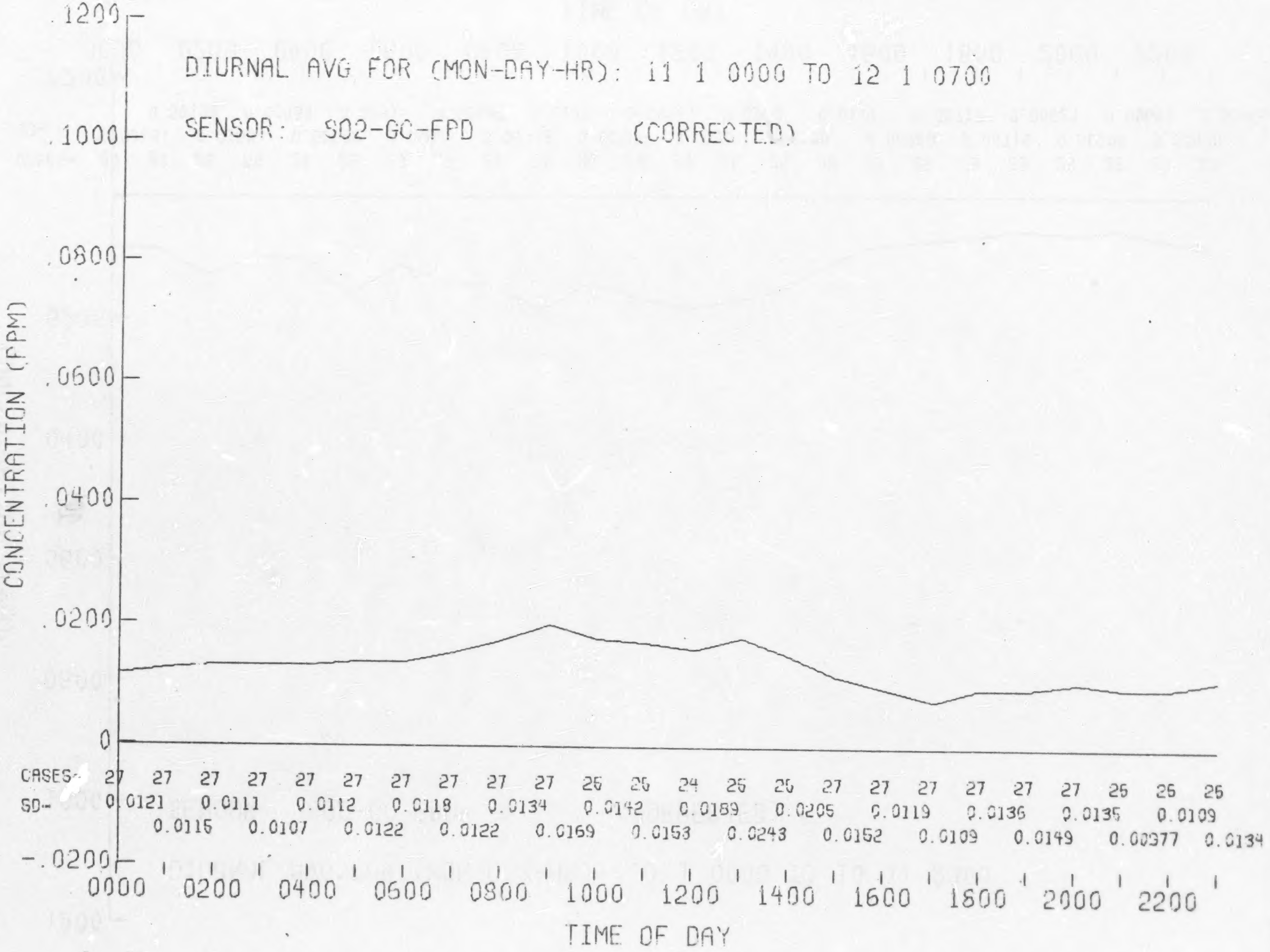
SENSOR: SO2-COND (CORRECTED)

 DIURNAL AVG FOR (MON-DAY-HR): 11 1 0000 TO 12 1 0700

SENSOR: SO2-COND (CORRECTED)


DIURNAL AVG FOR (MON-DAY-HR) 9 4 0600 TO 9 30 2300
SENSOR: S02-GC-FPD (CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 25 25 25 25 25 24 23 23 25 23 21 24 23 22 23 27 27 25 26 26 26 26 25 26
SD- 0.00536 0.00593 0.00500 0.00479 0.00563 0.00600 0.00759 0.0162 0.00657 0.00354 0.00297 0.00542
0.00538 0.00589 0.00395 0.00606 0.00596 0.00789 0.0105 0.00771 0.00499 0.00231 0.00516 0.00413
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY


DIURNAL AVG FOR (MON-DAY-HR): 10 1 0000 TO 10 31 2300
SENSOR: SO2-GC-FPD (CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES- 29 29 29 29 29 29 29 29 29 27 25 26 25 25 25 28 27 28 29 29 29 29 29 29
SD- 0.00531 0.00492 0.0160 0.00464 0.00502 0.0231 0.00627 0.00590 0.00712 0.0177 0.00584 0.00961 0.0130 0.0193 0.0138 0.0111 0.00720 0.00717 0.00719 0.00624 0.00904 0.00501 0.00890 0.00559
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY


DIURNAL AVG FOR (MON-DAY-HR): 11 1 0000 TO 12 1 0700
SENSOR: SO2-GC-FPD (CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES- 27 27 27 27 27 27 27 27 27 27 25 25 24 25 25 27 27 27 27 27 27 25 25 25
SD- 0.0121 0.0115 0.0111 0.0107 0.0112 0.0122 0.0118 0.0122 0.0134 0.0169 0.0142 0.0153 0.0189 0.0243 0.0205 0.0152 0.0119 0.0109 0.0136 0.0149 0.0135 0.00377 0.0109 0.0134
0000
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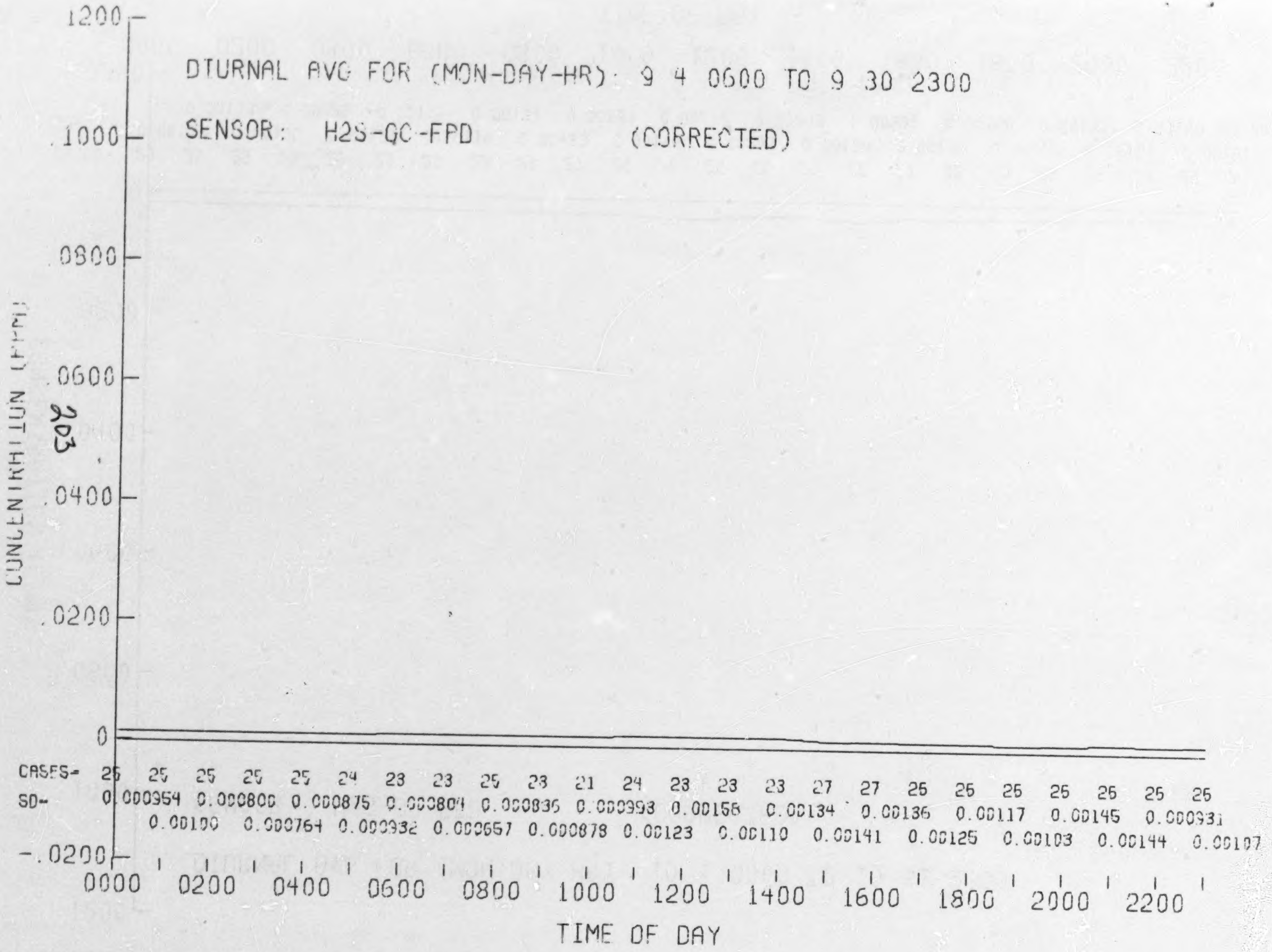
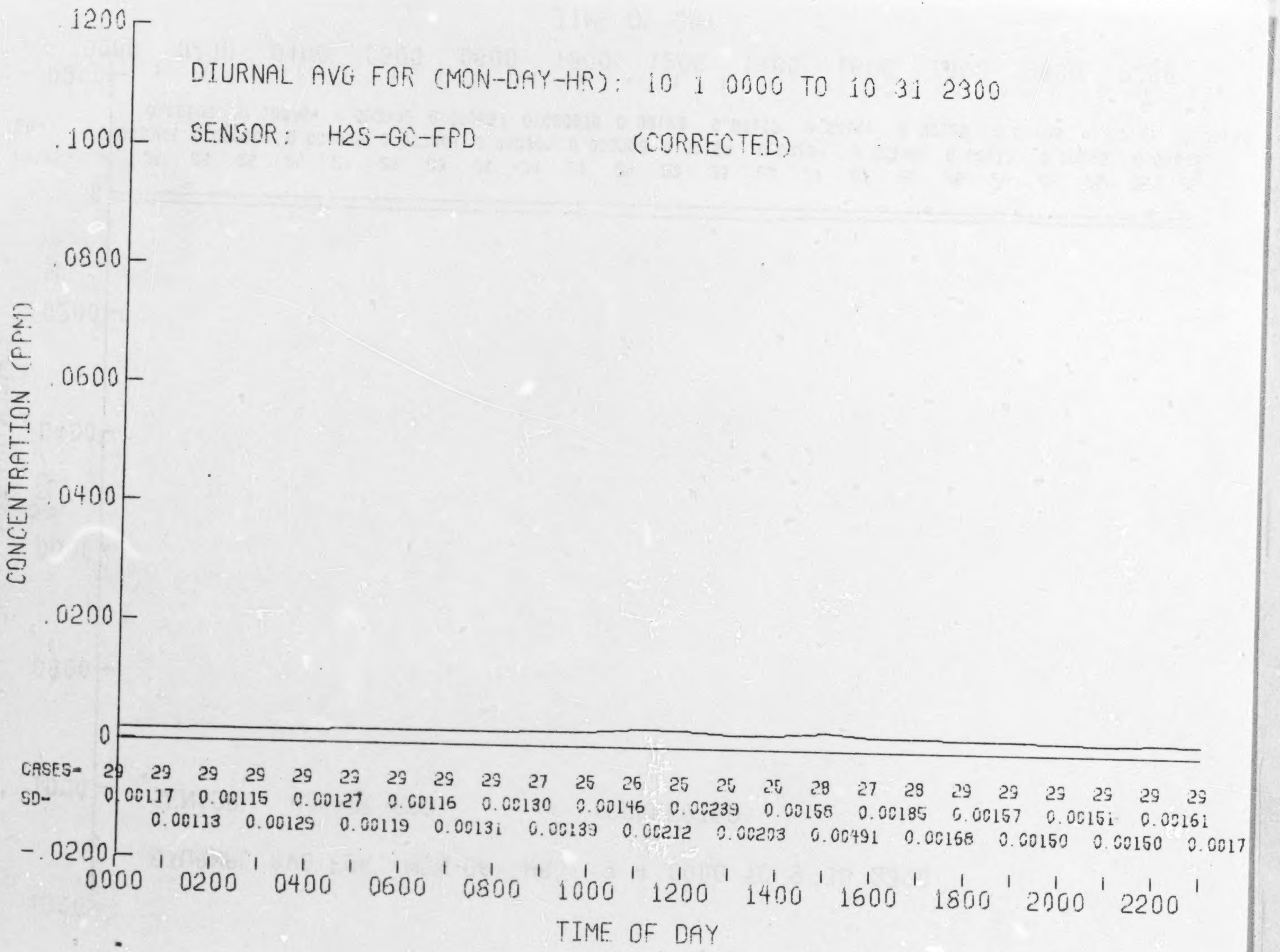
1200
1400
1600
1800
2000
2200
TIME OF DAY

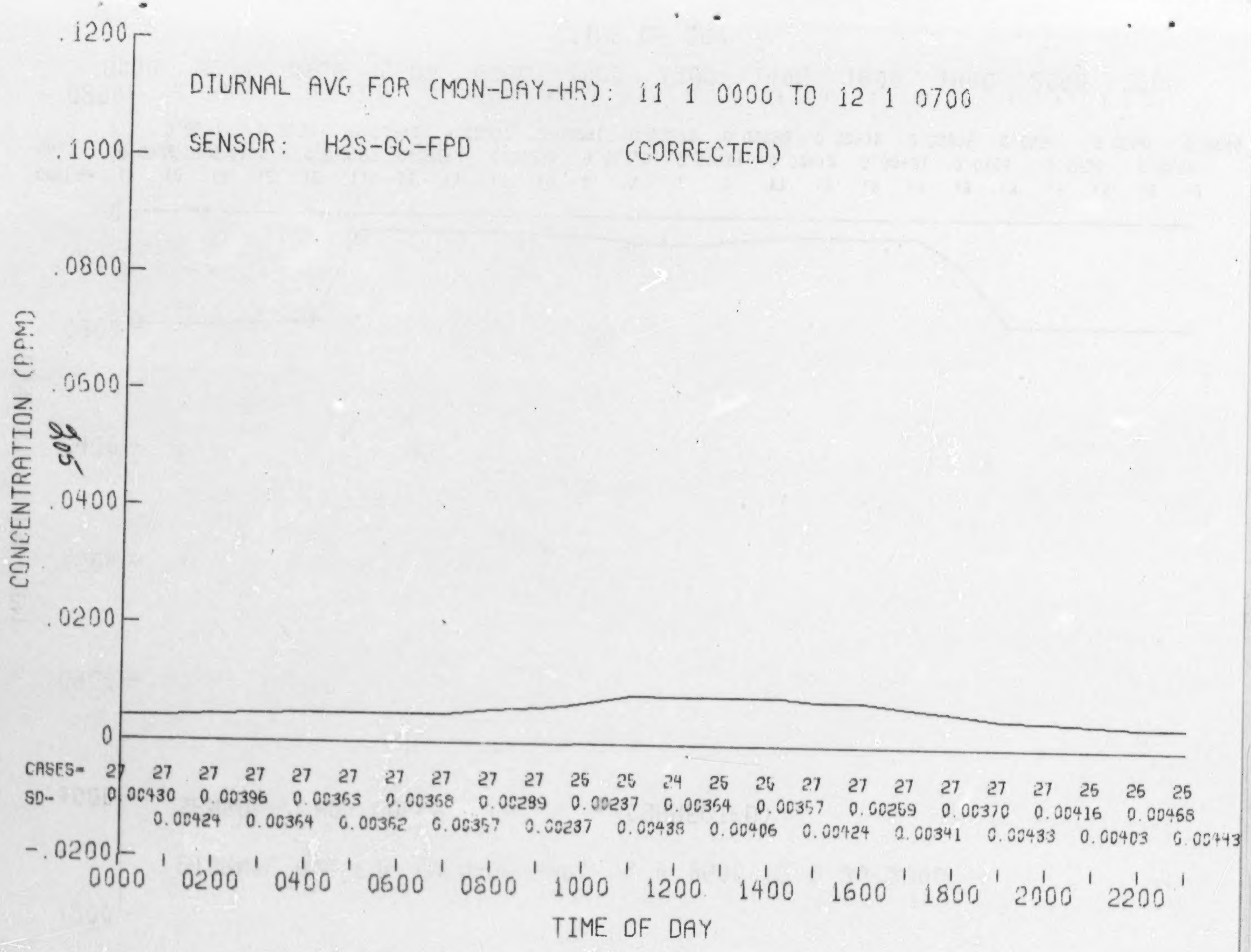


DIURNAL AVG FOR (MON-DAY-HR): 9 4 0600 TO 9 30 2300

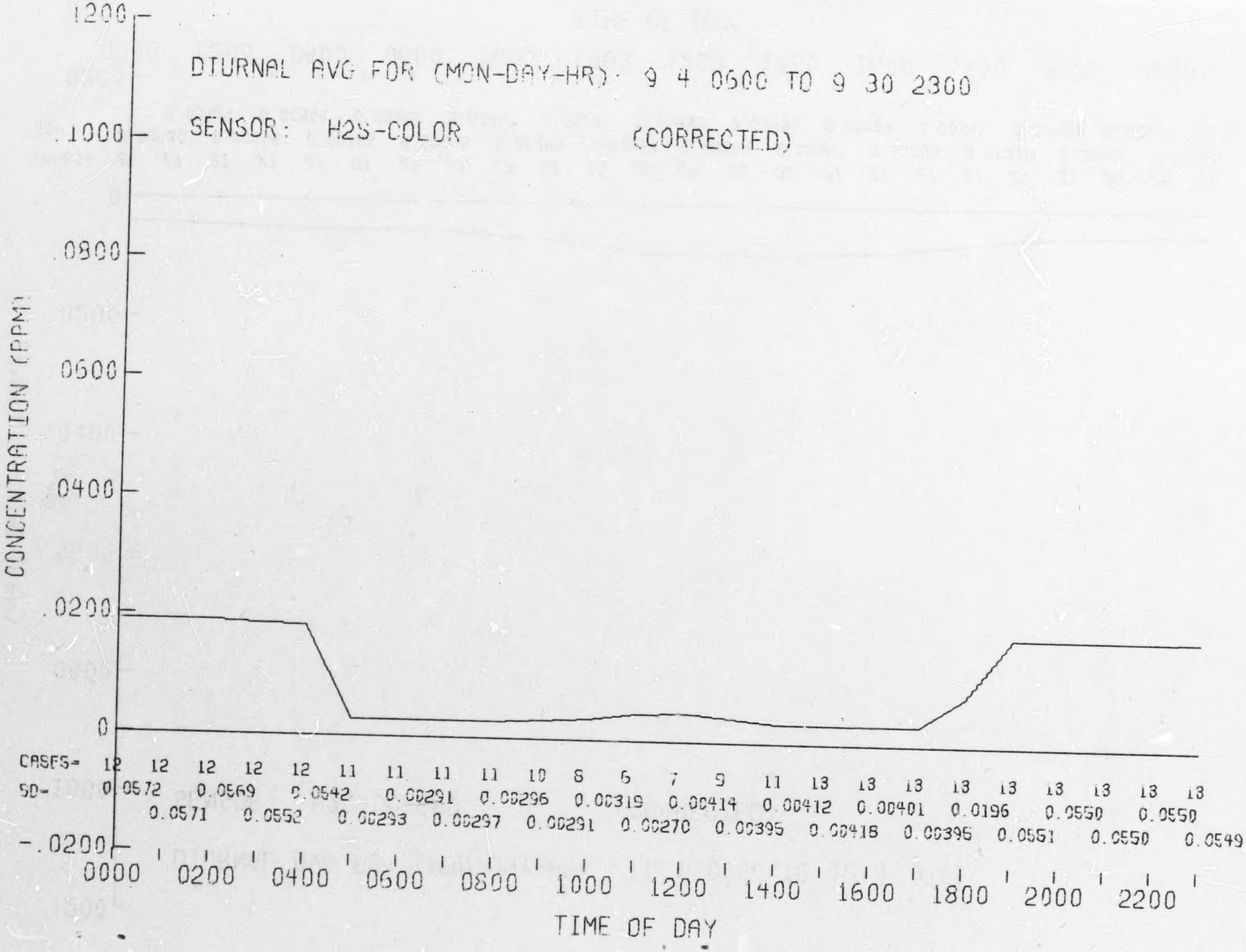
SENSOR: H2S-GC-FPD (CORRECTED)

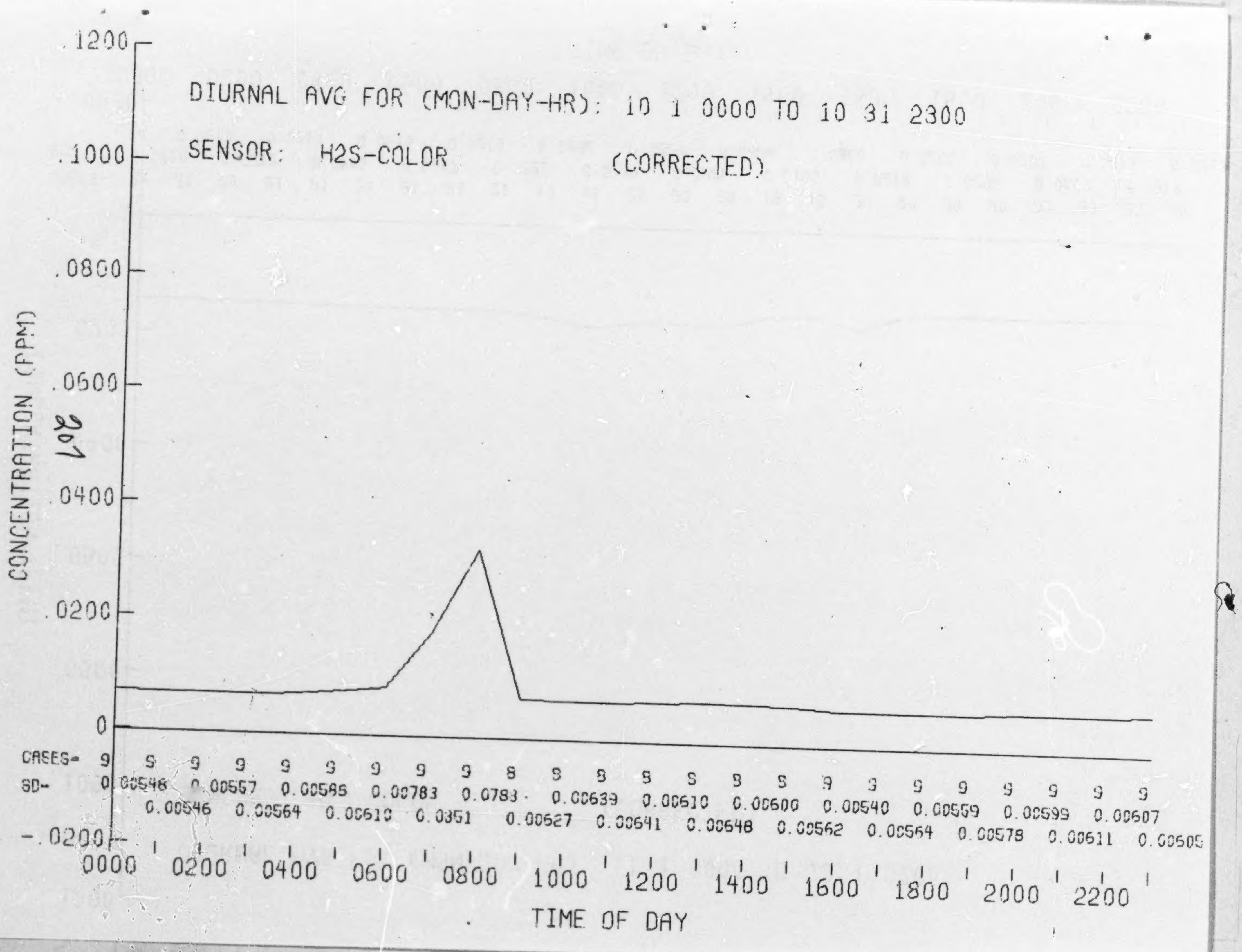

DIURNAL AVG FOR (MON-DAY-HR): 10 1 0000 TO 10 31 2300

SENSOR: H2S-GC-FPD (CORRECTED)


DIURNAL AVG FOR (MON-DAY-HR): 11 1 0000 TO 12 1 0700
SENSOR: H2S-GC-FPD
(CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 27 27 27 27 27 27 27 27 27 27 25 25 24 25 26 27 27 27 27 27 27 25 25 25
SD- 0.00430 0.00424 0.00396 0.00364 0.00363 0.00362 0.00368 0.00357 0.00289 0.00237 0.00237 0.00438 0.00364 0.00406 0.00357 0.00424 0.00259 0.00341 0.00370 0.00433 0.00416 0.00403 0.00468 0.00443
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY

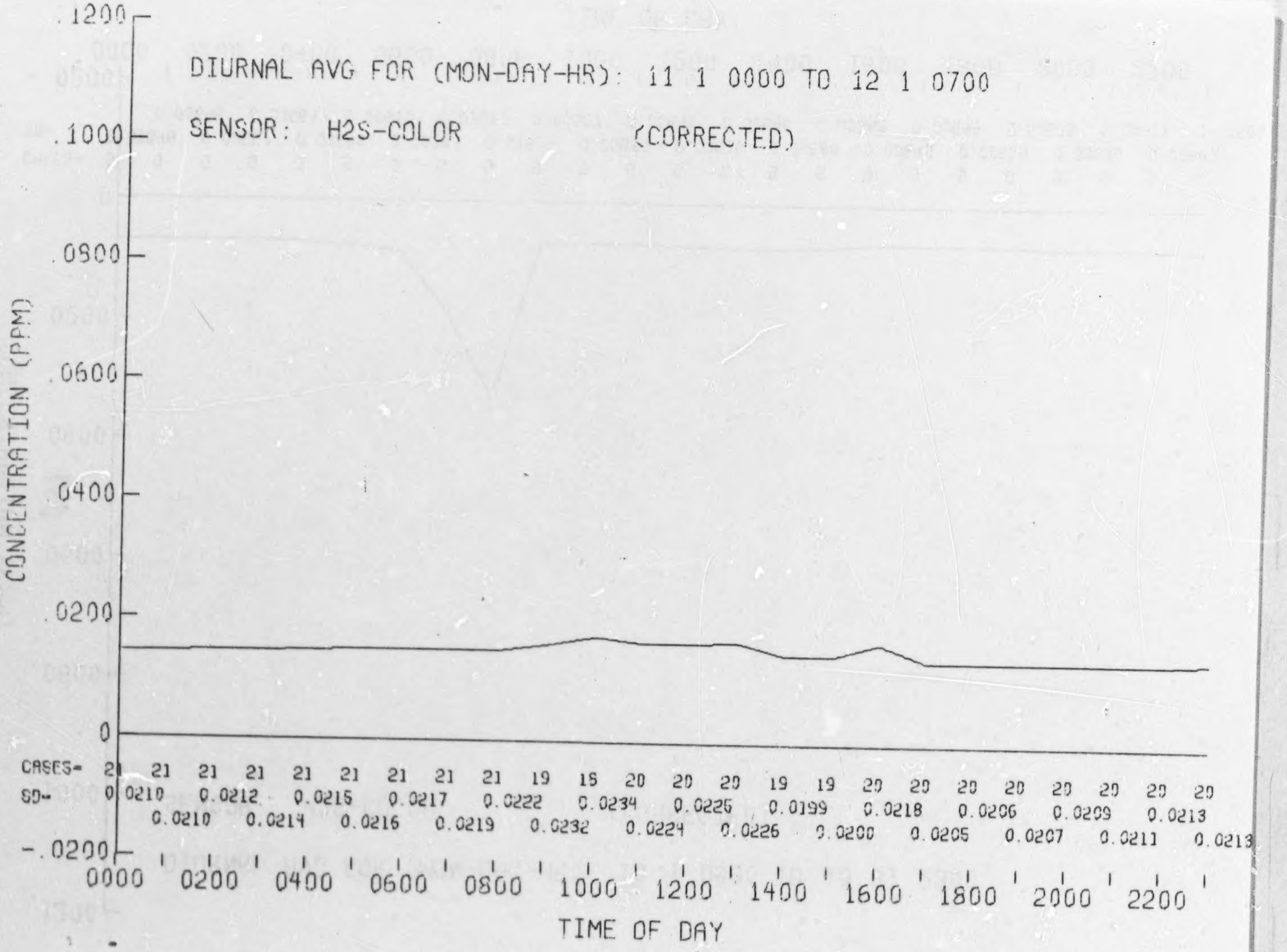
205


DIURNAL AVG FOR (MON-DAY-HR) 9 4 0600 TO 9 30 2300
SENSOR: H2S-COLOR
(CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES= 12 12 12 12 12 11 11 11 11 10 8 6 7 9 11 13 13 13 13 13 13 13 13 13
SD- 0.0572 0.0571 0.0569 0.0552 0.0542 0.00293 0.00291 0.00297 0.00296 0.00291 0.00319 0.00270 0.00414 0.00395 0.00412 0.00418 0.00401 0.00395 0.0196 0.0551 0.0550 0.0550 0.0550 0.0549
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY



DIURNAL AVG FOR (MON-DAY-HR): 10 1 0000 TO 10 31 2300

SENSOR: H2S-COLOR (CORRECTED)


DIURNAL AVG FOR (MON-DAY-HR): 11 1 0000 TO 12 1 0700
SENSOR: H2S-COLOR
(CORRECTED)
CONCENTRATION (PPM)
.1200
.1000
.0800
.0600
.0400
.0200
0
-.0200
CASES- 21 21 21 21 21 21 21 21 21 19 15 20 20 20 19 19 20 20 20 20 20 20 20 20
SD- 0.0210 0.0210 0.0212 0.0214 0.0215 0.0216 0.0217 0.0219 0.0222 0.0232 0.0234 0.0224 0.0225 0.0226 0.0199 0.0200 0.0218 0.0205 0.0206 0.0207 0.0209 0.0211 0.0213 0.0213
0000
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
TIME OF DAY

APPENDIX E

INSTRUMENT OPERATING PROCEDURES

The operating procedures that were followed for each instrument are summarized below. They are not intended to replace the original instruction manual but to give the operator a brief guideline for consistent operation for each instrument.

E.1 Technicon CSM 6

Start-up Procedure:

1. Verify that the power cords for the proportioning pumps, the voltage stabilizer, the signal conditioner, the recorder, heating bath, and the power plugs of the air boxes are plugged into proper power receptacles and the power switches are in "off" position.
2. Ascertain that appropriate optical filters are installed in colorimeter and flow cells have correct alignment.
3. Check the hydraulic and sampling connections are secure in accordance with flow diagram for each parameter to be measured, and that waste lines lead into waste containers.
4. See that all reagents required are in place and connected.
5. Verify that the recorder is functioning properly.
6. Place end blocks for manifold pump tubes over platen pins and reset platen assembly in place and lock.
7. Turn on power to the following units:
    a. colorimeter
    b. the two proportioning pumps
    c. the recorder
    d. signal conditioner
    e. heating bath
    f. air boxes
8. Run reagents for approximately 20-30 minutes to insure stability.
9. Set signal conditioner balance control to 500 for each channel.
10. Set R-S-OD Selector to OD position.
11. Adjust reference and sampler apertures of colorimeter (See manual).
12. Check rotameter and adjust vacuum pump to give the calibrated air for for each particular system.
13. Check reagent baseline and select suitable range of operation.
14. Perform dynamic calibration using permeation tube arrangement.

Daily Operation Procedure:

1. Check rotameter settings.
2. Check all connections for reagent leaks.

3. Inspect rotameters for condensation.

4. Check reagent reservoirs to insure enough reagent to operate for unattended period; replace fresh reagents weekly.

5. Check chart paper supply.

6. Check vacuum gauges to insure air pump is operating properly.

7. Check water level in bath - add water as needed.

8. Check instrument zero in each chennel using zero air (air minus pollutant). Reset to zero and note drift on calibration log.

9. Calibration each channel and note span-drift on log.

10. Not needed since inlet lines were never removed from sample manifold.

Weekly Operating Procedures:

1. Replace reagents weekly.

2. Flush system with 2.0 N Hydrochloric Acid (HCl) for 30 minutes.

3. Flush system with distilled water for 1 hour.

4. Check calibration of rotameters.

E.2 Mast Ozone Meter

Start-up Procedure:

1. (a) Inspect solution pump diaphragm replace if necessary
   (b) Prepare reagent solution
   (c) Fill fresh solution reservoir
   (d) Partially fill waste reservoir
   (e) Prime solution pump and bleed air

2. Measure air pump rate and set at (140 ml/min) with Bubble Flowmeter.

3. Select range of operation
   use range resistor 500 Ω - 0-1 ppm
   5000 Ω - 0-.1 ppm
   or set to desired concentration.

4. Connect strip chart recorder (0-10 mV).

5. Perform zero check and calibrate.

Routine Operating Procedure:

1. Fill reagent reservoir every two day.

2. Empty waste reservoir every two days.

3. Check chart for reasonableness.

4. Check solution pump periodically.

5. Record date/time/scale/irregularities.

6. Run zero check and calibrate weekly.

7. Check air pump rate monthly.

E.3 Ethylene Chemiluminescent O_3 Meter

Start-up Procedure:

1. Set air sample flow rate at 1500 cc per minute using mass flow meter by adjusting valve (3) in Fig. 1.
2. Set ethylene flow rate to 30 cc per minute.
    a. To set ethylene flow rate, first shut off needle valve (1) to ethylene cylinder. Allow line to flush for several minutes. Establish a 30 cc per minute flow by adjusting needle valve (2).
    b. Turn ethylene on slowly with needle valve (1) so that bubbles in soap bubble meter flow downward at a very slow rate. This shows an excess of ethylene.
3. Vent excess ethylene.
4. Set high voltage power supply to 1640 volts or a voltage to give the desirable span not exceeding 1900 volts.
5. Set the electrometer to the following:

    Range -10^{-9} amps F.S.
    Polarity - Minus
    Calibrate - Normal
    Buckout - Open
    Attenuator - S1

6. Check dark current level with zero air and calibrate.

Daily Operating Procedure:

1. Check air sample flow rate - correct before calibration is performed.
2. Check ethylene flow rate - correct before calibration is performed.
3. Check ethylene cylinder pressure weekly.

E.4 Philips SO_2 Monitor

Start-Up Procedure:

1. Connect cables and tubing to appropriate connectors.
2. Reagent level in coulometric cell should be on blue line--proper level is important.
3. Note pump operation by observing air bubbling in cell.
4. Set reference voltage to 740 millivolts.
5. Place selector valve in Measurement Mode (M).
6. Check for loose tubing and cable connections.
7. Attach recorder to jack number nine.
8. Set DESIRED RANGE 0.3, 3.0, 10.0 mg SO_2/m^3
9. Run zero check and calibrate

Daily Operating Procedure:

1. Note pump operation by air bubbles in cell.
2. Note-reagent liquid level should be at blue line at the rear of cell.
3. Check recorder for reasonableness and excessive noise.
4. Record date/time and irregularities.

Quarterly Maintenance:

1. Replace reagent.
2. Silver gauge for interference filter.
3. Vacuum pump.

E.5 Leeds and Northrup SO_2 Monitor

Start-up Procedure:

1. Fill and level wet test meter.
2. Connect monitor and wet test meter to recorder.
3. Prepare reagent absorbing solution.
4. Bleed air from reagent line.
5. Flush absorbing column with alcohol and potassium hydroxide solution.
6. Rinse absorbing column with distilled water.
7. Set reagent pump flow rate (Setting 37), 1 ml per minute.
8. Connect monitor and wet test meter to air pump.
9. Select range of operation.
10. Set air flow rate (5 ft^3/hour).
11. Fill drain cup with water.
12. After 2 hours warm-up set zero and calibrate.
13. Set timer if integrater is used.
14. Run zero check and calibrate.

Routine Operating Procedure:

1. Check reagent reservoir level and flow rate.
2. Check for proper drainage of waste.
3. Observe liquid level in wet test meter.
4. Observe cabinet temperature (should feel warm).
5. Check air sample flow rate record.
6. To shut down flush with distilled water.
7. Record date/time/scale/irregularities.
8. Periodically rinse and clean reagent storage bottle.

E.6 Gas Chromatograph SO_2 and H_2S Monitor

Start-up Procedure:

1. Connect hydrogen, oxygen and nitrogen gas lines to appropriate cylinders and leak test.
2. Connect air sample line to sampling port.
3. Set the oven temperature for the column at 50°C.
4. Set detector temperature and exhaust temperature to 100°C and 110°C respectively.
5. Connect electrometer, recorder and ignitor to flame photometric detector unit.
6. Flush the hydrogen, oxygen and nitrogen gas lines for a few minutes and then set the nitrogen flow rate at 100 cc per minute.
7. Set the oxygen flow rate temporarily to 60 cc per minute for lighting the faame. Press ignitor switch while starting the hydrogen flow and increasing to a final value of 75 cc per minute. Do not leave the ignitor switch depressed longer than 20 seconds.
8. Slowly decrease the oxygen flow rate to a final value of 15 cc per minute.
9. Set buckout offset current to approximately 5% chart scale.
10. Run zero check and calibrate.

Daily Operating Procedure:

1. Check column, detector and exhaust temperatures--make corrections before calibration is performed.
2. Check hydrogen and oxygen flow rates again make all corrections before calibration is performed.
3. Reset buckout if drift is excessive--may set it before or after calibration.
4. Check gas supply cylinders to insure that supply is sufficient for 24-hour operation.
5. Check nitrogen if anomaly in operation occurs or after replacing cylinder prior to calibration.
6. Check chart paper supply to insure that supply is sufficient for 24-hour operation. Change as necessary.

E.7 Melpar SO_2 Analyzer

Start-up Procedure:

1. (a) Connect vacuum pump to vacuum outlet at rear of detector chassis and plug into a 115 Vac, 60 Hz power source.

   (b) Connect hydrogen line from cylinder to hydrogen inlet to rear of detector chassis.

   (c) Set range selector switch to log position, calibrate switch to normal position, time constant switch to 1 sec, and Buckout to zero.

   (d) Set temperature controller to 70%.

   (e) Connect sample inlet line to metered inlet. Plug direct inlet with cap.

2. Turn on power and allow detector to warm up for 10 minutes.

3. Connect recorder to plug at rear of detector chassis. (Use 1 volt output).

4. Adjust air flow rate to 200 cc/min. (Setting of 57 on rotameter).

5. Note recorder output. Purge H_2 line for 15 seconds and shut off. Allow 15 seconds for air to purge burner block. Depress ignition bu on and hold while opening the H_2 flow control valve. Release ignition button within 15 seconds. When flame is lit, the recorder output returns to a slightly higher value than the initial start position. Adjust hydrogen flow to 200 cc/min. If flame does not light, repeat the above sequence.

6. Set amplifier switch to linear range required to monitor ambient conditions.

7. Run zero check and calibrate.

8. Refer to instrument manual for maintenance requirements, etc.

Routine Operating Procedure:

A. Daily

1. Check hydrogen cylinder pressure. Make sure regulator pressure reads 10 lbs/sq. inch.

2. Check air and hydrogen rotameter settings. Adjust to proper setting, if necessary, prior to the calibration period.

3. After setting rotameters do not adjust again until prior to calibration period.

4. Run zero check and calibrate using diffusion tube calibration system.

5. Note - rotameter setting periodically, do not readjust rotameters except prior to calibration.

B. Weekly

1. Check hydrogen pressure in cylinder. Replace cylinder when pressure drops below 100 lb/sq. inch.

2. Perform multi-point calibration weekly, preferably on Saturday or Sunday.

3. Replace 18 gauge hypodermic needle to stabilize air sample flow.